The United States MILLER

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McDonald's Fish Way.

In view of the importance of having proper fish-ways in all dams, we have opened correspondence with Col. M. McDonald, Superintendent of the Fisheries of the State of Virginia, and inventor of McDonald's Fish-way. This fish-way has been accepted by the Board of Public Works of the State of Virginia, and the owners of dams in that State are compelled by law to put in fish-ways and keep them in repair. The Board of Public Works, after a thorough examination, believes McDonald's Fish-way is the cheapest and best in the market. Owners of dams who feel an interest in this subject will do well to correspond with Dr. W. B. Robertson, Lynchburg, Va.

Description of McDonald's Fish-Way.—Fig. 1 is a perspective view of the way as it appears when in operation. It is represented as built of timber attached to a crib dam, and anchored to a rock bottom by means of iron rods. The intervening support may be piles, as in the engravings, stone cribs, or trestles. The builder will determine the best modes of securing, according to the circumstances of the particular case. At the head of the way is shown a V-shaped guard of timber, the lower edge of which is a few inches below the level of the crest of the dam. This will deflect the light floating material (sticks, leaves, etc.), and prevent any interference with the working of the way.

Fig. 2 is a perspective view of the upper portion of the way, with the side broken away to show the internal construction.

Fig. 3 is a sectional view of the same.

The course of the water in the way is shown by the arrows. The fish-way, when made in its simplest form, is a rectangular timber trough, two feet wide and two feet deep, inside dimensions. One end of the trough rests against the crest of the dam, the other in the pool below. The trough is firmly secured to the dam and to the bottom, and supported at intermediate points, if necessary. Transverse cleats, E, three inches high, at intervals of twelve inches, are nailed to the bottom of the trough. The stringers, B, rest upon the cleats, dividing the trough into three longitudinal compartments, the middle one being twelve inches wide, the latter compartments being five and a half inches each. The stringers are one-inch boards, ten or twelve inches wide, set on edge. The middle section of the way is divided by the inclined partitions or buckets, C, into a series of compartments, as shown in figs. 2 and 3. The lateral sections are similarly divided by partitions or buckets, D, inclined in a reverse direction, into a series of compartments, communicating below by the opening between the cleats, E, with the corresponding middle compartments. The division of the lateral longitudinal compartments is completed by the series of directing plates, G. The water is brought into the way through a notch or sluice in the dam, one foot wide and six inches deep, and the interior hollow floor of the way is beveled off level with the bottom of the sluice-way through the dam. The shoulder-blocks, F, prevent the water from the dam over-riding the lateral banked eddy-water.

The water passing through the sluice from the dam tends continually to sink in the middle line of buckets, and emerge at the sides at a lower level. The difference of level and directing plates, G, cause it to bank up on the sides and feed back to the middle of the way. The sinking in the middle is thus compensated, and a constant depth and constant velocity are maintained from the top to the bottom of the way.

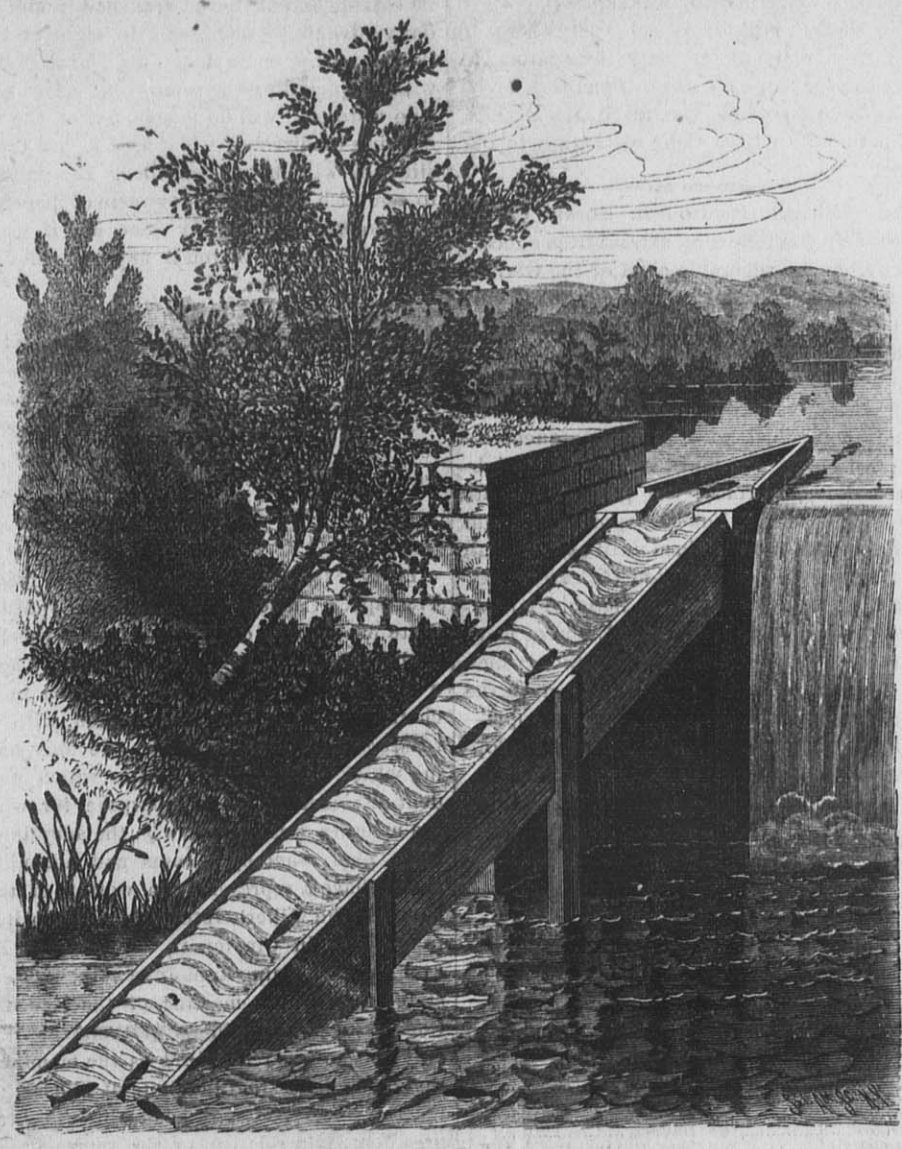


FIG. 1.—M'DONALD'S FISH WAY.

Fig. 2.

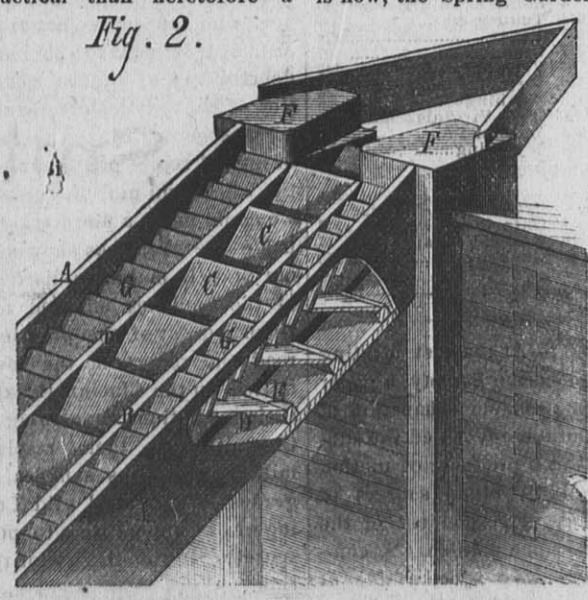
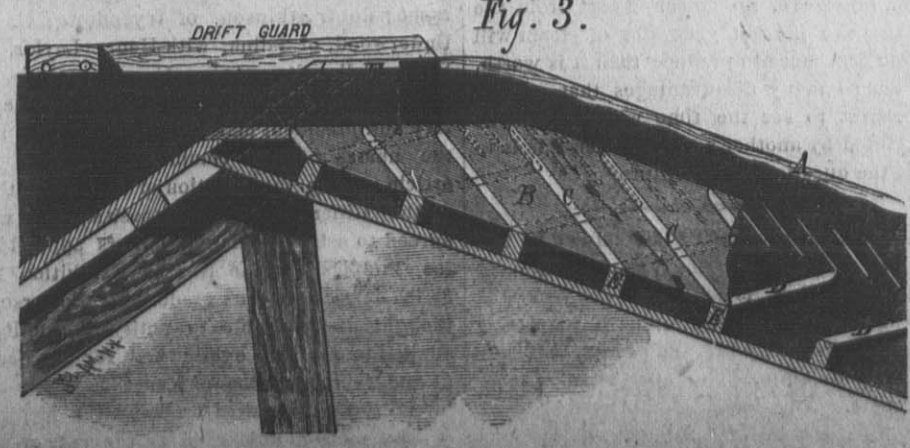


Fig. 3.



Technical Schools in Philadelphia.

The recent awakening of public attention to the question of technical education, is not merely local, as the public prints show this important subject to be an absorbing theme of discussion and action. Quite recently the Board of Education in Philadelphia decided to make the course at the boys' High School more scientific and practical than heretofore—a change that can but reflect credit upon that institution, which numbers among its instructors such careful investigators as Profs. E. J. Houston and Elihu Thompson. That the change will be a useful one in our eminently practical sister city, cannot be doubted.

The Industrial Art School having come under the roof and patronage of the Franklin Institute, is doing successfully a work that by rights belongs more nearly to the Academy of Fine Arts.

The various night schools teach mechanical drawing to a large number of pupils. Perhaps the Franklin Institute drawing school would have had more pupils had not the Industrial Art School opened business under the same roof, and used the same class rooms; but as it is now, the Spring Garden Institute is fairly entitled to the lead in this line, having now nearly 350 drawing pupils, from a beginning last year of only 20. Not satisfied with this unusual success, and with the good influence exerted by its library of 8,000 volumes, its free lecture courses, etc., this institute has reached out further and taken up the subject of manual training, (for which the Washington University, at St. Louis, is also preparing on an extended scale).

Instigated by the representations of possible usefulness, long but unsuccessfully held out by Mr. Robert Grimshaw to the older and slower moving Franklin Institute, the managers of the up-town institution have prepared to teach mechanical hand-work in systematic manner, somewhat on the plan copied by the Massachusetts Institute of Technology from the Imperial Technical School at Moscow. While the scope of these classes embraces four courses in wood-working and four in metal, it was decided to feel the public pulse by the establishment, at present, of only one of the eight laid down in the schedule. Accordingly the necessary announcements having been made, following public addresses on the desirability of such schools, more than the necessary number of applicants for instruction presented themselves; and a model vise workshop is now being fitted up, the opening of the classes having been announced.

There will be at first five model benches, 4x3 feet, each with two vises, and properly lighted. The vises will be of various patterns, so as to test the different makes in competition, and each pupil will learn to work on each kind of vise. The first ten weeks in the thirty weeks' vise-work course, covers only chipping and filing, each week a different piece being given, as follows, and in the order named: One of dogwood, to learn the "throw" of the file; five of cast iron, one of brass, one of steel, and two of wrought iron. In this course there will be used the chipping hammer and seven chisels, one rasp and eighteen files, besides the try square, calipers, surface plate, etc.

The Nicholson File Co., of Providence, R. I., kindly volunteered to give an extensive assortment of "increment cut" files for use in this model shop. No article will be made for sale; but some few useful pieces for use in the shop itself, as filing tables and blocks, scribers and scribing blocks. A very important feature (suggested by Mr. W. Barnet Le Van) is the idea of teaching the pupils to work "either handed." The lessons will be given "left-handed," and the practice hours devoted to both right and left handed work. The number of hours required to complete each object will be noted, as well as the weight of the material removed.

Parallel with the lessons (under the charge of Mr. John Hall, a veteran hand of nearly forty years' experience) will run a series of lectures on the nature of the materials and tools used the classes, and on the philosophy of the operations performed. In all cases the right way of working will be pointed out, with the reason why it is the right way; the learner will be warned of faults to be avoided, and shown what causes their commission.

Altogether the plan is a sensible and practical one. The director of the schools, the instructor in the test courses, and the managers of the institution, are well-known to be enterprising and practical, and have recently proved themselves prudent and alive to popular demands.

From time to time we expect to give notes concerning the progress of this important movement.—*The Manufacturer and Builder.*

THERE is a story told of a blunt old sea captain who was noted for his personal plainness. Being present at a party, he had taken no part in the dance, and his hostess had some difficulty in providing him with a partner. At last she led him up to a prim and aged spinster, at the same time whispering a few words of apology in his ear. "Oh, you needn't make any apology, madam," said he, with alacrity. "Any old thing is good enough for me."

THE winter in Europe and Asia is unusually severe this year. A private letter from Constantinople, written last month, says: "All Europe and Asia Minor are buried in snow, so we must expect cold weather for some time longer. If the spring weather does not set in early, we shall be very hard up for wood in Constantinople. It is already enormously dear, and there is great suffering among the poor."

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We send out monthly a large number of sample copies of THE UNITED STATES MILLER to millers who are not subscribers. We wish them to consider the receipt of a sample copy as a cordial invitation to them to become regular subscribers. We are working our best for the milling interest of this country, and we think it no more than fair that our milling friends should help the cause along by liberal subscriptions. Send us One Dollar in money or stamps, and we will send THE MILLER to you for one year.

MICHIGAN farmers complain that the mild winter has injured the growing wheat and a light crop is predicted.

CHICAGO, Cincinnati, St. Louis, Indianapolis, Milwaukee and Louisville—the six leading packing cities of the west—have slaughtered 4,172,000 hogs since Nov. 1, 1879, a falling off of 793,500 from the previous year.

WILHELM BRAUN of Carlsbad, Bohemia, (whose advertisment appears in this paper), has taken out quite a number of American patents. He manufactures porcelain rolls and roller mills.

WE have received during the past month, several letters from Germany, Austria and Switzerland indicating that a large number of exhibits would be sent to our Cincinnati Exposition. It is probable that most of the articles from Germany will be exhibited under the direction of President van den Wyngaert, of the German Miller's Association.

MILLING is extremely quiet. Everybody seems to be waiting for something to turn up, and in the meantime are just grinding enough to keep their mills in order. A "boom" is expected in the "Sweet By and Bye." By the way quite a number of the bulls and bears are fond of singing the above named song.

TREASURY estimates, telegraphed from Washington, place the customs receipts for February at nearly fifteen millions, and the internal revenues at about nine millions. Should the receipts continue at this rate for the remaining four months of the fiscal year, the customs will aggregate about a hundred and fifty-three millions, and the internal revenue to about one hundred and seventeen millions, making a total of three hundred millions. The expenditures for the same period are estimated at about two hundred and seventy-eight millions.

THE foreign press is unanimous in commending the action of Congress in passing a resolution to admit foreign machinery for exhibition at the Millers' International Exposition free of duty.

THE Davis-Fisher poisoning case is on trial at St. James, Minn. These men were formerly partners in the milling business at Medalia, Minn., and Fisher accuses Davis of giving him poisoned raisins. From a hasty perusal of the testimony taken thus far it seems as if Davis would be honorably acquitted, and that Fisher will be convicted of having had a touch of billious colic.

To Mill Furnishers and Manufacturers.

CATALOGUES WANTED.

We desire mill-furnishers everywhere to send us a copy of not only their latest but older catalogues. We desire them to keep on file in the office of the UNITED STATES MILLER. Let none fail to have their catalogues in our office.

THE political situation in Europe can be guessed by the following extract from a recent letter from the venerable chief of the German armies, Gen. Von Moltke in reply to a friend who had suggested a general disarmament by each of the great continental powers: "Who does not share the heartfelt desire to see those heavy military burdens relieved which Germany is compelled to bear in consequence of her position in the midst of powerful neighbors? Neither princes nor governments are deaf to that desire; but a happier condition of affairs cannot be attained until nations shall have arrived at the conviction that every war, even though victorious, is a national misfortune. Even the power of the Emperor is inadequate to bring about this conviction, which can only result from an improvement in the religiou and moral education of the people—the fruit of centuries of historical development which neither of us will live to see!"

Millers and Millwrights of the United States and Canada.

The new millers' directory for 1880, just published by us, gives the names of mill owners and millwrights in the United States and Canada as follows:

UNITED STATES.

States.	No. of Addresses	States.	No. of Addresses.
Alabama	214	Mississippi	168
Arizona	6	Missouri	704
Arkansas	148	Montana	11
California	145	Nebraska	173
Colorado	39	Nevada	5
Connecticut	201	New Hampshire	157
Dakota	28	New Jersey	316
Delaware	68	New Mexico	17
District of Columbia	5	New York	1604
Florida	35	North Carolina	209
Georgia	218	Ohio	1005
Idaho	8	Oregon	80
Illinois	893	Pennsylvania	1791
Indiana	695	Rhode Island	27
Indian Territory	4	South Carolina	90
Iowa	644	Tennessee	359
Kansas	277	Texas	270
Kentucky	477	Utah	57
Louisiana	38	Vermont	187
Maine	173	Virginia	277
Maryland	155	Washington Ter	26
Massachusetts	288	West Virginia	190
Michigan	615	Wisconsin	676
Minnesota	397	Wyoming	2

DOMINION OF CANADA.

Provinces.	No. of Addresses.	Provinces.	No. of Addresses.
British Columbia	4	Ontario	947
Manitoba	18	Prince Ed. Island	17
New Brunswick	97	Quebec	250
New Foundland	1		
Nova Scotia	74	Total	15,572

AFTER COAL, WHAT?—At the last meeting of the Liverpool Engineering Society, a paper was read touching the probable exhaustion of coal, in which the author advocated the substitution of the tides as a producer of motion which would outrival all other sources of mechanical power. A correspondent of the *Builder*, too, is of the same opinion. A compressed air chamber filled by the tide at Brighton, for instance, would, he is confident, run an atmospheric railway, such as Brunel invented, from that place to London. If the tides could be thus utilized, all our railways and factories, in fact, all the work now done by the steam engine, could be performed by them. There would, moreover, be no jerk, no steam, no smoke, no noise. Apart from the fact that the present generator of steam will in time cost more to produce than it is worth, coal has so many disadvantages that no one will regret to see the time when it will be supplanted by another agent. When this is to be, is the question of the future.

THE annual prize of $5,000, offered by the King of Belgium for the encouragement of intellectual effort, is offered for the year 1881 for the best work on the means of improving ports established on low and sandy coasts like those of Belgium. The offer is open to all foreigners. Americans can forward their articles through the Department of State at Washington.

Proposed Flour Call Board.

Quite a number of members of the Milwaukee Board of Trade have manifested a deep interest in the establishment of a Flour Call Board, and a movement is now on foot to secure the introduction of a Flour Call Board here. It has been introduced in St. Louis and in answer to an inquiry as to its success by the Secretary of the Millers' National Association, Mr. S. H. Seamans, a prominent member of the St. Louis Board of Trade writes: "In regard to our Flour Call Board, I can sum up as follows by saying that it is demanded and approved by our progressive element, and the opposition comes from original and persistent opponents of *all future trading, including wheat*, but those who protested against its establishment have weakened under the daily advantages manifest In eighteen business days the trade foots up 35,866 barrels without including the sample and order sales. The "protest" will be considered at the next meeting of directors, March 1st, but the institution will *not* be suspended. You will have to establish first a correct system of inspection by grade, if not already done, and if we can be of any service to you in any way call on us for what you want."

It will be seen by the foregoing that this branch is in active and successful operation. We think this is a matter of great interest to the milling industry. If the grades are satisfactory to St. Louis operators, we can see no reason why they could not be made so to Milwaukee operators.

The Kansas Millers.

LAWRENCE, Kans., February 17th, 1880.—The special meeting of the Kansas Millers State Association called for this date was held at the office of J. D. Bowersoek Esq. at seven o'clock p. m. with president Atkinson in the chair. The meeting was opened with the reading of the minutes of the previous meeting which were approved, after which president Atkinson stated the purpose for which the meeting was called: viz: the adoption of some plan whereby Kansas and her millers should have a representation worthy of their name in the Miller's International Exposition, to be held in Cincinnati, commencing May 31st and continuing until June 26th, 1880, He stated tbat at the meeting of the Executive Committee of the Miller's National Ass'n. in July last he was recognized as the member of that Committee from the State of Kansas, and that he has received a communication from president Bain relative to the representation of Kansas at the coming Exposition, he further stated that the different railroads throughout the State had very kindly offered to aid us in securing samples of wheat etc. along the respective lines of road and offered free transportation of same—he urged the action of MILLER'S in regard to this matter and spoke of depreciation of Kansas wheat in the estimation of Eastern dealers owing to the mixing of screenings with it and therefore the necessity of a good representation, and he thought with the wheat and mill products that Kansas had, we could make a fine display. Mr. Bowersock made a few remarks showing the necessity of our State in making a display, and also spoke of the facilities afforded for our doing so. Upon request of the president, the secretary read the report of the Iowa Miller's Committee on the Cincinnati Exposition and read their resolutions concerning the display. This Committee in their resolutions asked all millers for 50 lbs samples of their different grades of flour, and said Committee consisting of 5 members were to manage the representation in the display for the State Association.

After much deliberation, the following members were chosen on the committee to collect samples of mill products, grain, etc., for our state and see the same was put on exhibition:

B. E. Langdon, of Fort Scott; O. W. Baldwin, of Ottawa; J. D. Bowersock, of Lawrence; Robt. Atkinson, of Wyandotte; C. R. Underwood, of Salina, with Henry Laylor, of Valley Falls, alternate.

Upon motion it was agreed that the secretary and president make a report and sign the the names of the committee above to an article stating the intention of the Association at the Miller's National Exposition. It was agreed to ask the different millers applied to for samples for the Kansas Exhibition for 50 lbs samples of each grade. Mr. Bowersock thought it advisable to notify the millers applied to, that the exhibit was for the benefit and representation of Kansas. There being no further business on hand the meeting was by motion adjourned to the call of the president.

O. W. BALDWIN, Sect'y.

Great Mills.

Minneapolis is already famous for its great flouring and saw mills, but a greater flouring mill than the new Washburne A, now in course of construction, is about to arise at that famous milling center. The capacity of the flouring mills now erected and in running order at the "head of navigation" is about 16,700 barrels per day, which is equivalent to a consumption of over 80,000 bushels of wheat. The largest mill now has a capacity of 3,000 barrels daily. There are, in all, twenty-five mills. The new mill on which work will soon commence, is to be erected by Gov. Pillsbury, that gentleman having recently consummated a purchase of a desirable site on the east side of the river at Minneapolis. This new mill will be seven stories in height, 150x175 feet in dimensions, and in all respects will be a formidable rival to the Washburne A. What the future of Minneapolis is to be as a milling center is now difficult to say, but it is already a famous spot for mills, made so by its unsurpassed water power. The flour manufactured at these mills stands higher than does the finest white winter wheat flour made at some of the famous mills in St. Louis, and the choisest brands of their spring wheat flour commands a higher price in the markets wherever it is sold. With such large milling facalities at this point it is easy to conjecture what would be the result of a decided failure of the wheat crop of that state; but then they have the great wheat fields of the Red River and the Dakota county to fall back upon, and a crop, as yet, has not been known to prove a serious failure in this rich agricultural districts. The great wheat grower, Dalrymple, who had a crop of over 20,000 acres last year, will put in the coming spring an additional 5,000 acres, and increase his farm help to 700 hands.—*Chicago Journal of Commerce.*

Millers' and Millwrights' Directory for 1880.

We have just completed the publication, and are now ready to deliver a very complete directory of the flour mill owners in the United States and Canada, with their Post-office addresses, and in thousands of instances giving the number of runs of stones, number of sets of rollers and kind of power used, whether water, steam or wind. The work contains about 15,600 addresses. It is of great value to mill-furnishers, dealers in mill supplies of all kinds, flour brokers, or anybody else that desires to reach the milling industry by circular, catalogue, letter or otherwise Price Ten Dollars per copy, sent by registered mail, post-paid. Address all orders to the UNITED STATES MILLER, Milwaukee, Wis. Money orders or drafts should be made payable to the order of E. Harrison Cawker, Publisher.

Ed. P. Allis & Co., Milwaukee, Wis., have among the many orders for the Reynolds-Corliss engine the following large machines: Joliet Iron & Steel works, Joliet, Ills., a pair of blowing engines with steam cylinders 32x54 inches and air cylinders 48x54 inches. The engines will be direct acting, vertical machines with wrought iron frames. Carson & Rand, Eau Claire, Wis., 28x60; C. Lamb & Son, Clinton, Iowa, 26x48; Menomonee Mining Co., Milwaukee, 16x42; do 20x48; The Whitbeck Lumber Co., Chicago, 26x48; J. W. Young & Co., Clinton, Iowa, 28x48; Theo. Zschetzsche & Son, Sheboygan, Wis., 16x42; The Winona Milling Co., Winona, 26x60, and are now erecting a 28x60 for a mill in Milwaukee. The Reynolds-Corliss is proving itself the best automatic cut-off engine in the market.

Mr. John Lamb, Waitemata Mills, Auckland, New Zealand, writes under date Dec. 6, 1879: The grain crops in this cauntry are looking remarkably well. The season so far has been all that could be desired, and if the weather continues, the quality of our wheat will be superior, and we shall have a much larger quantity to export than has hitherto been the case from this country. Our farmers will be cutting in this province in January next; in Canterburv in February. The wheat in the province of Auckland is always superior to the southern wheat, but we have exported none of it yet. The difficulty we have is to get labor for farming purposes, also good journeyman millers.

FRANCE imported $73,600,000 worth more food products in 1879 than in 1878.

How Great Inventions are Made.

There is a very prevalent notion that an inventor is a tinkering fellow, an uneasy sort of mechanic, who is always experimenting, cutting and trying, with a vague expectation of some day hitting upon something novel and possibly useful. Doubtless there are in almost every community men who waste there time and means in brainless labor of that character, would-be inventors, who, having no clean cut or well-considered purpose in view, are very busy at nothing, making a show of invention without ever inventing anything. But such men are no more worthy of the name of inventor than the corner loafer who wrangles over the affairs of local politics is worthy of the name of statesmen.

The real inventor is a man of an entirely different type. He knows precisely what he is driving at, and very frequently his invention is entirely thought out before the first stroke is made to put upon paper or to shape it in a more material form, "When you strike a difficulty, what do you do?" was asked of an inventor whose fame is world wide for his many achievements in overcoming alleged impossibilities. "I sit down and think," was the sufficient reply.

The capacity to think is the inventor's first and most essential endowment, and no amount of tinkering, however patient and mechanically skillful, can ever take its place. A striking example of the true inventor's ability to think creatively is furnished in the inventions of the late Erastus B. Bigelow. He was not a mechanic, he had no practice in the use of tools, he could not even handle a pencil with skill and facility. His inventions were made in the recesses of his brain, where the complicated machinery of each was created, thought out in detail, before any attempt was made to give it material embodiment. To a writer in the last issue of the *Bulletin* of the National Association of Wool Manufaeturers, Mr. Bigelow said that his most recent carpet loom—one upon which seventy-two yards of Brussels carpet have been woven by one girl in ten hours—was completely worked out in his mind and mapped upon his brain, not in his study or factory, but in the railroad cars while making his last visit in Europe. After satisfying his mind and eyes with foreign sights and scenery, an irresistible fit of invention came over him. Retiring within himself, the machine soon assumed in his mind complete form in every part and detail. Showing a rough sketch of the invention, the only drawing of it that had been made, Mr. Bigelow said: "All I have now to do is to direct a draughtsman to work in the details." Subsequently the narrator saw the draughtsmen in the inventor's study, under his direction, at work upon the drawings from which the machine was to be constructed. The inventor, copying from the plans imprinted in his brain, dictated to the draughtsman (who acted as a mere pantograph) every line, circle and curve which was to be transferred to the paper, giving its exact place, length and dimensions. The result was a working drawing, from which alone the machinists were able to construct a perfect machine, working without experiment or adjustment exactly as it was contrived by the inventor.

The difference between the working of a mind like Mr. Bigelow's and that of an inferior inventor is one of degree, not of kind. The same kind of thinging is done with more or less thoroughness by every true inventor. And those who stop short in their creative thinking and begin to materialize their invention too soon only multiply their chances for going wrong, increase their labor needlessly, and demonstrate their incapacity to reach the higher levels of the art of invention. To begin to build when the object is but vaguely apprehended is to invite confusion and failure by turning the mind off from the highway of invention to the bewildering by-paths of unintelligent experimentation.

In that wide field of invention in which the self-imposed task of the worker is to accomplish a new result by a wise choice and combination of known means, the rules to be followed are admirably set forth in Mr. Bigelow's description of the working of his own mind in developing the inventions for which he is so honorably known. Speaking upon this point he said:

"My first step toward an invention has always been to get a clear idea of the object aimed at. I learn its requirements as a whole, and also as composed of separate parts. If, for example, that object be the weaving of coach lace, I ascertain the character of the several motions required, and the relations these must sustain to each other in order to effect the combined result; secondly, I devise means to produce these motions; and thirdly, I combine those means and reduce them to a state of harmonious co-operation. To carry an invention through the first and second stages is comparatively easy; the first is simply an investigation of facts; the second, so far as I can trace the operations of my own mind, comes through the exercise of the imagination. I am never at a loss for means in the sense above explained. On the contrary, my chief difficulty is to select from the variety always at command those which are most appropriate. To make this choice of elementary means and to combine them in unity and harmony—to conduct, that is, an invention through its last practical stages—constitutes the chief labor.

"In making this choice of elementary parts, one must reason from what is known to what is not so—keeping in mind, at the same time, the necessary combinations, examining each element not only in reference to its peculiar function, but as to its fitness also for becoming a part of the whole. Each devise must be thus examined and re-examined until harmony and unity are fully established. I find no difficulty in effecting that concentration of thought which is so necessary in pursuits like mine. Indeed, it is not easy for me to withdraw my mind from any subject in which it has once become interested until its general bearings, at least, are fully ascertained. I always mature in my mind lhe general plan of an invention before attempting to execute it, resorting occasionally to sketches on paper for the more intricate parts. In building a machine, a draughtsman prepares the working drawing from sketches furnished by me, which indicate in figures the proportion of the parts, I never make anything with my own hands. I do not like even drawing to a scale."

Inventors less favored by nature with the power of close and long-continued mental concentration which Mr. Bigelow was blessed with or lacking the vividness and accuracy of his conceptions and the strength of memory, which enabled him to hold fast the mental image of a complicated machine which his imagination had put together, may have to resort sooner to the pencil sketch or to the material model. But these are apt to become distractions rather than aids, and the young inventor should study to do without them as long as possible. The moment the inventor materializes an idea his power over it is so far lessened. If the material form is not just what it should be to suit the ultimate combination, it is far harder to recast it, in the third stage of invention as described by Mr. Bigelow, than it would be if preserved as a purely mental conception.

Of course, to the man who has creative mental power, a hand skilled in the arts of drawing and mechanical construction may be, and, if properly exercised, will be, a desirable adjunct in the art of invention; but it is not an essential factor, for many successful inventors have been, like Mr. Bigelow, unable to give their new conceptions material embodiment; and where manual skill furnishes a too ready incentivc to the overhasty materialization of crude ideas, it is an accomplishment which the genuine inventor can well afford to dispense with.—*Scientific American.*

French Statistics.

According to the "Annuaire Statisque," recently published by the Minister of Agriculture and Commerce, the total population of France, a little under 37,000,000 in round numbers, is divided into 12,000,000 inhabitants of towns and 25,000,000 inhabitants of the country. On eliminating from the general total 860,690 individuals (who are soldiers, sailors, students in schools, infirm and diseased, prisoners, or monks not giving instruction), the total of a little over 36,000,000 persons participating fully in social life comprises with regard to means of existence and professions, 210,200 persons without known professions, 71,300 vagabonds and mendicants, 2,151,900 stockholders (including 195,000 pensioners of the government), 1,531,400 persons exercising liberal professions or living by them, 3,827,200 persons engaged in trade, transport and navigation, or living on their products, 9,274,500 persons engaged in various industries or living by them (6,000,000 in small industries, 3,000,000 in mining and manufactures); 18,968,600 persons practicing agriculture or living by it (of whom 10,500,000 are proprietors of their land, nearly 6,000,000 are tenant-farmers, 2,500,000 are agricultural specialists, comprising vine-growers). On entering into detail of each of the great branches of the national production it is found that 4,000,000 of proprietors of agricultural tenants (of whom 400,000 are women) employ—as clerks, 82,000 men and 54,000 women; as work-people 590,000 men and 378,000 women; as day laborers, 922,000 men and 764 000 women; as domestics 661,000 men and 663,000 women; and, on the other hand, that the families maintained by the landed property or agricultural work consists of 3,800,000 persons of masculine sex, and 7,200,000 of feminine; 1,125,000 industrial patrons (of whom 226,000 are women) have for clerks 143,000 men and 50,000 women; 1,555,000 workmen and 1,000,000 workwomen; 305,000 male day laborers, and 244,000 female; 78,000 male domestics and 143,000 female. The families living by industrial operations embrace nearly 1,600,000 persons of masculine sex and 3,000,000 of feminine; 784,000 employers in trade and carriage (of whom 221,000 are women) have 247,000 male employes and 71,000 female; 198,000 workmen and 56.000 workwomen; 140,000 male day laborers and 80,000 female; 65,000 male domestics and 188,000 cooks or nursery maids. They support families amounting to 661,000 boys and 1,346,000 girls.

Putting Up Shafting.

The writer once had the putting up of considerable shafting, and following are some of the data respecting the same, the rules and formulas found in text-books being insufficient to form a correct opinion by. The writer found that 800 pounds, acting on the end of a 12-inch lever, would twist of a wrought-iron shaft one inch in diameter. The *length* of the shaft had no influence on the breaking or twisting-off force, or torsional strength of the shaft, though on the length depended the torsional elasticity. The speed of a shaft controls its size, that is, if a one-inch shaft is large enough to transmit a given force at 50 revolutions per minute, a shaft running at a 100 revolutions per minute will transmit the same force, its *area* being one-half of the one-inch shaft. This is plain enough when one remembers that the surface of a pulley on the smaller shaft travels *twice* as far in the same time that a similar surface on a similar pulley on the slower shaft travels, and hence needs transmit but half the force, to equal the force through half the distance.

Suopose we have a factor of safety of 4, this will allow of our continuing a force of 200 lbs. (800 divided by 4 equals 200) on the end of our 12-inch lever. That is, 200 will be a safe load. Now, if we wish to find the *area* of a shaft, to transmit 10 H. P. at a speed of 300 revolutions per minute, over a 24-inch pulley, we multiply 33,000 feet (one H. P.) by 10 H. P., obtaining 330,000, which, divided by the number of feet the run of the pulley passes through per minute (6.28 ft. plus 300 revolutions), will equal the strain on the end of a lever equal to the radius of the pufley. In the case supposed, the radius of the pulley equals 12 inches, the size of the one for comparison. If it had not it would have been necessary to reduce it to 12 inches, that is, the effect the force would have at 12 inches. This force, whatever it may be, then being divided by 200 (the safe load on a one-inch shaft) will equal the area of the needed shaft, that is, it will equal the area in units of the area of a round shaft one inch ln diametcr—7,854-10,000ths of a square inch.

To reduce the radius of the pulley, whatever it may be, to the standard of the unit of comparison—12 inches—suppose the pulley was 40 inches in diameter, the radius is 20 inches. If the force as found were 50 lbs., we would multiply the 20 inches by 50, and divide the product by the length of our standard lever, 12 inches. The result being the weight necessary at the end of a 12-inch lever that would be equal to the force or strain on the belt over the pulley. For instance, let us take the conditions of the case given: Number of feet raised one foot high in *one* H. P. x 10 = 330,000, Circumference of pulley = 6.28 feet, which multiplied by 300 = 1,884 feet per minute, that the rim of the pulley moves through; 330,000 divided by 1,884 = 175.15, that is, 175.15 lbs. is the constant strain on the belt, because 175.15 lbs. through 1,884 feet = 10 H P. = 330,000.

This steam is transmitted to the pulley which acts as a lever, equal to the radius of the pulley, tending to twist off the shaft. The radius of the lever in this cone is 12 inches, which happens to be the same as our lever of comparison.

Thus we have a force of 175.15 lbs, acting on the end of a 12-inch lever; 200 lbs. on the end of a 12-inch lever was, as previously stated, a safe load for a one-inch round shaft; 175.15 divided by 200 = .875 = ⅞ of the area of a shaft one inch in diameter = .6872 of a square inch, and would be a trifle over nine-tenths of an inch in diameter.

Thus, so far as torsional strength is concerned, a one-inch round iron shaft will transmit with safety 10 H. P.; but there is another feature of the question to be looked after, and that is the lateral stiffness of the shaft.

A one-inch shaft, five feet between hangers, will be deflected from a straight line 9-64ths of an inch by a pull of 28 pounds midway between hangers, while a pull of 56 pounds will cause a deflection of ¼ of an inch. However, there are few shafts of two inches and under that are not constantly deflected ¼ when transmitting power, especially if the pulley is midway between the hangers. The deflection of shafting is approximately represented by the general law that deflection increases as the cube of the length, and inversely as the cube af the diameter. Thus, if we should leave but 2½ feet between hangers, the deflection would be $(2\frac{1}{2})^3 = 15.6$ and $5^3 = 125$, and $125 \div 15.6 = 8$, therefore the deflection at 2½ feet between hangers would be 8 times less than it would be 5 feet between hangers. A 1½-inch round shaft, 10 feet between hangers, will be deflected 9-16ths at the center by 56 pounds.

A three-inch shaft, 10 feet between centers, would be deflected a trifle more than 1-16th at the center by a pull of 56 pounds. The remedy for deflection is more bearings, setting the pulleys as close as possible to bearings, and speeding the shaft up. Small shafting will not break, nor twist off when put up in accordance witht he above data.

Many dollars have been thrown away in putting up large and slow-running shafting, which is so expensive at first cost, liable to break for want of alignment and excessive weight. The lighter shafting is by far the most economical in every respect—first cost is less, expense of putting up and keeping up is less, and has a longer life, and runs with less friction.

How many of your readers would be surprised to see a two-inch shaft taking off 100 indicated H. P.? A great many, I think. Still, I have in mind just such a shaft, which has been doing the above amount of work for 11 years, and which was put in to take the place of a four-inch shaft, which had broken repeatedly. I believe I am correct in saying that there is no necessity for a line shaft larger than two or two and one-half inches in any shop or manufactory in the United States.

The shaft mentioned above as taking off 100 H. P. made less, I think, than 200 revolutions per minute, The shaft might easily be reduced in area one-half and more by doubling the speed, There are a great many shops, now running with three and four-inch shafting, that might make a few dollars by selling the same and replacing it with one and three-fourth and two-inch shafting. It will be well to remember the following: Never put up a slow-revolving shaft when a fast one will do as well (and that is nine cases out of ten.) Increase the bearings, as such increase does not affect the friction, and increases the life of the shafting.—*V. Hook, in American Machinist.*

A new American turbine, 48 inches in diameter, manufacttred by Stout, Mills & Temple, of Dayton, Ohio, was tested at the flume in this city, January 3d, being the second wheel of this improved pattern tested here. The first wheel was tested by James Emerson early in last September, and gave high results, and a large amount of power for the diameter and head. It utilized as large a percentage of the whole power of the water as any wheel of equal power known at that time, while in average from whole to half gates it was in advance of nearly every wheel that had been tested. This wheel, although not intended for the competitive tests, was left here and subsequently tested by a board of engineers under an arrangement made by the Holyoke Water Power Company. These tests verified those made by Mr. Emerson, and even obtained a fraction of one per cent greater than Mr. Emerson had. The test was made under about 17 feet head, and produced 139 horse power, while the former American turbine of same diameter and head produced 86 horse power. The proprietors continued these experimental tests with the hope of perfecting a wheel that would give double the power of the American turbine, and they were much gratified by the result of the test of last month, which gave nearly 170 horse power, and an average percentage of .774 from full to half gates, which is higher than any turbine, producing as many horse power under an equal head, ever tested at this flume. The manner in which the port gates were obtained was by the measurement of water passing the weir, without reference to the gate openings. We are informed that these tests will be continued until a full line of sizes as are usually made are completed and tested. As the "New American" now stands at the head of the list, those interested in the subject will watch with anxiety to see the progress made in the future.—*The Paper World* (Holyoke, Mass).

UNITED STATES MILLER.

E. HARRISON CAWKER, EDITOR.

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Bills for advertising will be sent monthly unless otherwise agreed upon.

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MILWAUKEE, MARCH, 1880.

THE UNITED STATES MILLER has now commenced its eighth volume, and has become universally acknowledged to be one of the most valuable milling journals in America, both for the purpose of transmitting knowledge on milling and mechanical subjects and as an advertising medium for introducing and selling all kinds of modern milling machinery. It is our aim to meet the wants of our patrons, whether manufacturers or consumers. Our editorial course will be entirely independent, and we shall do our best to give our readers the benefit of the latest important news on subjects pertaining to the objects of this paper. Our circulation and advertising patronage cover all sections of the country We do not deal in machinery ourselves, and consequently have no "*axes to grind.*" We cordially invite all those who have already patronized us to continue their patronage, and those who have not to try our columns. We append herewith our

ADVERTISING RATES FOR 1880.

	1 mo.	4 mos	3 mos.	6 mos.	1 year.
One inch card	$ 2 00	$ 4 00	$ 5 50	$10 00	$20 00
Two "	4 00	8 00	11 00	20 00	40 00
Four "	6 00	12 00	16 50	30 00	60 00
One-half col. (8 inches)...	10 00	20 00	30 00	60 00	100 00
One fourth page.....	20 00	40 00	60 00	120 00	200 00
One-half page	40 00	80 00	120 00	200 00	400 00
One page.....	100 00	150 00	200 00	400 00	800 00

Size of page, 12x18. Length of column, 16 inches. Width of column, 2⅜ inches; 4 columns to each page.

Business editorial matter per line, 30 cents. If over 50 lines, 25 cents.

Illustrations charged for in proportion to space occupied.

Advertising for Millers wishing situations, or millers wanting to engage employes, 50 cents.

MILL FOR SALE advertisements, $2 each insertion.

Subscription price to the UNITED STATES MILLER, $1 per year.

M'Lean's Millers' Text Book, which every miller should have. Price by mail, 60 cents, post paid.

Ropp's Easy Calculator, which every business man should have in his pocket or on his desk. Price by mail, post paid, FIFTY CENTS.

Our Job Printing Department is one of the finest in the State, and particular attention is paid to all kinds of commercial work, which we can do on the most reasonable terms. Parties desiring to publish catalogues, circulars, etc., should send for estimates.

Address all communications to the

UNITED STATES MILLER,
Milwaukee, Wis., U. S. A.

The Time Extended.

The Board of Directors of the Millers' International Exposition, at a recent meeting, unanimously voted to extend the time of the exposition two weeks. As now arranged it will open May 31st, 1880, and will close June 26th.

Subscribe for the U. S. MILLER; $1 per year.

IT is estimated that Australia and New Zealand will have 12 000,000 bushels of wheat available for export this year.

THE air bladders of codfish are considered a great delicacy by epicures.—*N. E. Grocer.*

A sort of wind pudding, so to speak.

WANTED.—Any of our readers who have a spare copy of the UNITED STATES MILLER for July, 1879, will confer a favor on us by sending it to us.

SOMEBODY says that the Cincinnati brewers propose to raise the price of beer during the progress of the Millers' Exposition. Vell, vot ov it? Guess der millers can drink schnapps, ain't it?

PARTIES in need of water wheels should send to N. F. Burnham, of York, Pa., for full particulars. See his advertisement in another column. His wheels are in use in all parts of the world.

AN Ohio man whose wife has broken his nose, made dents in his head with clubs and other weapons, and locked him out of her apartments regularly for six years, thinks he has discovered perpetual motion.

ON our front page will be found the new advertisement of J. H. Redfield, of Salem, Ind. Mr. Redfield's middlings purifier is highly spoken of by those who ought to know its merits. Write to him for full particulars.

WE call the attention of our readers to the advertisement on our front page of Messrs. McKay, Haddow & Park, flour merchants in Glasgow, Scotland. The firm of McKay, Haddow & Co. have recently taken into partnership Mr. William M. Park, late with Messrs. Kosmack & Huelsekopf, of Glasgow. The firm as it now stands announce that they are thoroughly able to handle consignments to great advantage.

We respectfully request our readers when they write to persons or firms advertising in this paper, to mention that their advertisement was seen in the UNITED STATES MILLER. *You will thereby oblige not only this paper, but the advertisers.*

We will send a copy of the MILLERS' TEXT BOOK, by J. M'LEAN, of Glasgow, Scotland, and the UNITED STATES MILLER, for one year, to any address in the United States or Canada, for $1.25. Price of Text Book alone, 60 cents. Send cash or stamps.

☞THE UNITED STATES MILLER *has the largest circulation of any milling journal published in America, and was the first milling journal started in America entirely independent of connection of interest with some machine or mill-furnishing establishment.*

THE old established mill-furnishing house of Geo. R. Gale, Cleveland, Ohio, is reaping its share of the "business boom," and is thronged with orders from all quarters. The goods furnished always give the very best satisfaction. Write to him for prices.

CANADIAN SUBSCRIBERS. — We send out monthly a goodly number of sample copies of this journal to Canadian millers, and our subscription list in Canada is by no means inconsiderable. We hope to be favored with letters containing items of news or other interesting correspondence from our Canadian neighbors.

HON. EDWARD SANDERSON is spoken of as a probable delegate to the National Republican Convention, and also as being the right man to represent the Milwaukee district in Congress. No one who knows him doubts but he would ably represent Milwaukee as her Congressman, but whether he will be content to change his headquarters from his splendid flouring-mill to the national "bear garden" is the question his friends feel anxious for him to decide.

WE call the attention of our readers to the new advertisement of the Victor Heater Co,, of Minneapolis, Minn. They have placed their Heaters lately in the Standard & Northwestern Mills, Minneapolis; also in the mills of Wm Lampy, Chaska, Minn.; Leinan & Roeschise, Watertown, Minn.; Stokes Bros., Janesville, Minn.; Lincoln Bros., Olivia, Minn.; Thompson & Stichtor, Fisher's Landing, Minn; Wells & Dickey, Forrest Mills, Minn.; John M. Cole, Rochester, Minn.; J. T. Fisher, Madelia, Minn.; Owens & Co., Anoka, Minn.; C. May, Excelsior, Minn.; J. Seigel, Carver, Minn.; Miller & Phelps, Montgomery, Minn.; H. A. Hayden & Co., Jackson, Mich., and others too numerous to mention.

JOSEPH F. GENT'S NEW PATENT FOOD.—Mr. Joseph F. Gent, the well-known millwright, of Columbus, Ind., has recently patented a new article of food which he calls "*Prepared Cereal.*" It is an alimentary product from corn, which consists of hulled, dry, hard, uncooked flakes made from the kernels. The process is described as follows: First, crushing the corn in the dry state and separating the hulls therefrom; second, steaming the granular material to soften and toughen the particles without cooking the same; third, pressing and drying the particles to reduce them to dry hard flakes. Mr. Gent has assigned his patent to the firm of Gaff, Gent & Thomas, millers, of which he is a member. We look for samples of the new product in the market soon.

MESSRS. Ganz & Co., of Budapest, Hunary, manufacturers of the celebrated corrugated, fluted and plain chilled iron Roller Mills, write us that they will have a complete line of their Roller Mills and other valuable flour milling machinery on exhibition at Cincinnati. The Ganz Roller Mills are well known in the leading mills of Europe. Between 2,000 and 3,000 of these Roller Mills are now said to be in use. During the past year they have been introduced into this country and our millers are manifesting quite an interest in them. Millers will do well to write to Messrs. Ganz & Co., Budapest, Hungery, for full information. They correspond in English, German or French. Postage on letters weighing ½ ounce or less to any part of Europe is 5 cents.

The Warsaw Mill in Rice Co., Minn., was burned Jan. 31.

Have We More Flouring Mills than We Need?

We estimate, and we believe our estimate to be too low rather than too high, that there are 40,000 runs of stone in the flouring mills of the United States. Now place the capacity of each run of stone per day of twenty-four hours at twenty-five barrels of one hundred and ninety-six pounds, and the daily capacity of the flouring mills of the United States is a round million of barrels. About four and a half bushels are requisite to make a barrel of flour. This shows that our flour mills need (4,500,000) *four and a half millions of bushels of wheat per day.* Our total crop for 1879 was about 448,000,000 bushels, which, if all manufactured into flour by our mills, would keep them busy only about 100 days. Deduct the amount of wheat exported, and there was not enough wheat left in this country to keep our mills busy three months out of the year. If it was not for the corn, oats, rye, buckwheat, etc., which the millers are called on to grind into human food and feed for stock, some of our millers would be complaining of dull times most of the time. And yet there seems to be a continual demand for new flouring mills. The truth of the matter is that we have too many of the rickety old rattle-traps called mills that are not worth a dam (*mill*-dam we mean, of course), and not enough of modern well-equipped and ably managed mills. The time is past in most parts of this country when bread consumers will be satisfied with the stuff which used to pass current for flour because it was wheat pulverized, no matter how. In neighborhoods where these old-fashioned mills exist which have outlived their generation, the farmers sell their grain to and buy their new process flour from the store-keeper, while the miller has the satisfaction perhaps of grinding their feed. There is room and plenty of it for good modern flouring mills in this country. With a favorable season our wheat harvest for 1880 will astonish not only the world, but ourselves. The milling fraternity should use all honorable means to secure the result of shipping flour instead of wheat. Not a bushel of wheat should leave our shores for foreign countries. The substitution of sacks for export flour instead of wheat has done great service toward increasing our export trade in flour, and none of our first-class mills had occasion to shut down so long as our wheat market was not so tremendously influenced by speculation. There appears to be a marked tendency of late towards centralization of the flouring industry, and plans for great mills are being laid in various well-known milling centres. As "the big fish eat up the little ones," it seems that the large modern mills are destined to displace hundreds of little old-style mills in the near future. Like "Grandfather's Clock" they have served their purpose and their day is past.

Sample Copies.

Parties who receive copies of the "UNITED STATES MILLER" with the words "sample copy" printed thereon, will thereby know that thereby know that their names are inserted in the *Directory of the Millers and Millwrights of the United States and Canada* for 1880. If any change should be needed at any time, please notify us. It is a matter of importance to every flour mill owner to have his name and post-office address in our Millers' Directory. We hope to enroll on our subscription list a great many new names in 1880. The subscription price is One Dollar per year post-paid to any part of the United States or Canada. We guarantee all a live newsy paper and of great value to all connected with the trade. We shall be pleased to have any mill-owner, operative miller or millwright, write to us any time. Jot down your news on a postal card in any way, in German, English or French. We will fix it up in plain United States for publication. Let us hear from you quickly and often, and—"*don't you forget it!*"

A Word to Foreign Visitors.

The Miller, of London, England, in referring to the proposed visit of British Millers to America at the time of the Millers' National Exposition, encouraged its readers to believe that the party would meet with a most cordial reception and allowed to visit and examine the interior of our leading flour mills. The *Milling World*, of Buffalo, endeavors to dissipate in a measure this impression, by claiming that our mill-owners would show them a good deal but there were probably some things that our millers would not deem it "business" to show.

Now we just wish to say a word to the British millers who anticipate visiting the United States. We feel confident that there are not half a dozen prominent mills in the United States whose owners will decline to admit our British visitors and show them all they desire to see. There are, probably, just about half a dozen mills that are trying experiments that will not care to open their doors to foreign visitors when they, at the same time, keep them closed on millers of our own country. If any millers won't "show up," the machinery men will, and when our Yankee machinery men try to take anybody through a mill they generally succeed. We say to our British milling friends, and in doing so we believe we express the sentiments of our readers, that they will be warmly welcomed, and that if we can teach them anything we shall be glad to do so, and if they can teach us anything, as they undoubtedly can a great deal, we shall be the most happy to learn. We hope to see a very large delegation from foreign shores at the Cincinnati exposition.

A List of the Exhibitors up to date.

Richmond City Mill Works, Complete Mill Job.

Nordyke & Marmon Co., Complete Mill Job.

Simpson & Gault, Complete Mill Job.

Henry Simon, Manchester, England, Complete Mill Job,

Bradford Mill Co., Complete Mill Job.

E. P. Allis & Co,, Complete Mill Job,

Howes, Babcock & Co.,—J. T. Noye & Sons—Huntley, Holcomb & Heine,—J. T. Shuttleworth—Complete Mill Jobs.

Wilcox, Shinkle & Miller, Portable Mills Water Wheels.

Thomas Bradford, Portable Mills.

Milwaukee Middlings Millstone Co., Middlings Mills.

Munson & Bros., Portable Mills, Millstones and Mill Machinery.

Downton Middlings Purifier Co., Rolls.

Knowlton & Dolan, Grinding Mills.

Bryan Corcoran, London, England, Millstones, etc.

John Fiechter & Sons, Liverpool, England, Flour Mill Machinery of Swiss manufacture.

John H. McGowan & Co., Steam Pumps and Leather Belting.

James Jones, Portable Mills.

C. Dowell, Flour and Corn Meal Dryer.

Howard Lockwood, Paper Stand.

Miller and Millwright Pub. Co., Paper stand.

Northwestern Miller, Paper Stand.

E. A. Sittig, Paper Stand.

W. H. Hinkle & Co., Flour.

Miles & Son, Flour.

Parthel Grate Bar Co., Grate Bars.

J. N. Knox, Grain Scourer and Separator, etc.

Coombs & Gray, Hominy Mill.

Raymond Bag Co.

Wolf & Hamaker, Middlings Purifier.

W. & N. Thayer, Middlings Purifier.

Eureka Manufacturing Co., Wheat Brushes.

Bemis Bros. & Co., Bags for Export.

Joliet Mfg. Co., Corn Shellers.

Stilwell & Bierce Mfg. Co., Turbine Water Wheels.

M. Deal & Co., Smutters and Separators.

Thos. McFeeley, Diamond Dresser.

John Hafner, Eureka Coil Springs.

Lane & Stevens, Separators and Scourers.

H. W. Caldwell, Grain Conveyor.

A. N. Wolf, Middlings Mills.

A. B. Bowman, Pulleys, Heaters, &c.

Barnard & Leas, Milling Machinery.

H. & L. Chase, Bags and Bagging.

F. Lunkenheimer, Brass Goods.

N. Bassett & Co., Sifting Machines.

C. C. Phillips, Milling Macinery.

Teter & Allen, Middlings Purifiers, &c.

J. H. Redfield, Middlings Purifier.

Wm. Richmond, Bran Dusters, &c.

Cockle Separating Co., Cockle Separator.

H. C. Potts, Flour.

A. S. Wren & Sons, Flour.

Warren Buckner & Co. Scales.

Geo. T. Smith Purifier Co., Middlings Purifier.

T. F. Rowland, Elevator Buckets.

C. Dewell, Flour and Corn Meal Dryor.

Stewart's Vienna Bakery.

Reports of the condition of the wheat plant from nearly all the counties in California have been received, which show a greater acreage than ever before, and that it is in a most excellent condition, promising an abundant harvest. California millers are strongly favoring the inter-oceanic canal scheme, and believe if it was completed they could ship all their surplus wheat in the shape of flour to European ports. During the past year the exports of flour to Japanese and Chinese ports have been considerable, with prospects of a steadily increasing trade.

The Chemistry of Bread Making.

[A lecture delivered by Prof. Graham, D. Sc., before the Society of Arts, London, Nov. 24, 1879.]

If starch be heated to the temperature of about 300 degrees, Fahr., more especially if there be a slight quantity of moisture in the starch, it is converted into a substance which is called British gum. We call it dextrine because it differs from the ordinary gum arabic in its action upon the plane of polarized light. Dextrine is called so because it rotates the plane of vibration of polarized light 209 degrees to the right. Here is a specimen of it. Dextrine may be prepared from starch in a variety of ways. The most convenient is to mix the two parts of nitric acid, or aquafortis, with 800 of water and then apply that very weak acid liquid to 1,000 parts of starch. They are thoroughly incorporated and left to dry in the air or by other convenient means. When dry, the substance is heated to the temperature of 220 degrees Fahr. A much lower temperature is sufficient when the acid has been previously employed than when merely dry starch is used. Another method of making dextrine from starch is to take starch and boil it in a small quantity of water, then add to that an infusion of malt. The malt converts the starch into a variety of products, but the first action is to convert the starch into maltose—which is a sugar I shall have to describe to you hereafter—and dextrine. So soon as the iodine liquid indicates that the starch has disappeared or that the whole or nearly the whole of the starch has disappeared it is then rapidly boiled, in order to prevent the ferment in the malt infusion carrying on the hydration of the starch any further, the object being to obtain the gum or dextrine, and not maltose sugar I said that mere heat would convert starch into dextrine, but much more so if the heat be moist. The Vienna baker, and, imitating him, the Parisian baker employs this ingenious reaction in the glazing of the beautiful rolls of Paris and Vienna. It is their practice, and it is adopted in London by a few of our bakers, to allow steam from the boiler to be injected into the oven just as the bread is about to be placed in it. This steam, coming in contact with the highly heated walls of the oven, becomes superheated; it is not wet steam but perfectly dry steam. The bread is, however, wet on the surfuce, and placed in this atmosphere, and the action of the steam upon the surface of the roll is to cover it with a beautiful layer of British gum, just the same as you will find at the back of postage stamps, which is also made from starch.

Dextrine or British gum when made by either of the processes I have described, posesses the following properties: It is a gummy body, resembling in its viscosity the ordinary cherry tree gum and gum Arabic. It is employed largely in calico printing as a thickener, for the purpose of printing on the cloth the necessary mordants and colors. Dextrine is soluble in cold water, and starch, you will remember, is not. A solution of dextrine is precipitated by alcohol—more or less. You see the clear liquid is rendered turbid by the additiob of alcohol. Iodine gives with dextrine little or no action.

There are two or three modifications of dextrine—erythro dextrine, which gives a brown tint on the addition of iodine; the others, achromatic dextrines, give no color reaction, and are, according to Brown and Heron, the most numerous. Dextrine has no action on the Fehling's liquid, that is to say, pure dextrine, but if you repeat the experimeut upon ordinary commercial dextrine, you will find there is a little action. This is owing to the mode of preparation. In acting upon starch by means of acid—which I have already shown you is one of the methods for making dextrine from starch—a small quantity of sugar must be formed. On the other hand, if you use the malt infusion, it cannot form dextrine without also forming maltose sugar, and hence, therefore, we have sugar formed as well as dextrine. The chemist has means at his command for separating from the ordinary dextrine the sugar, and also the starch, so as to obtain nothing else but dextrine, and a sample of dextrine so obtained has no action upon Fehling's liquid any more than a solution of starch has.

Basic acetate of lead, added to a solution of dextrine, throws down a precipitate, and this is sometimes a convenient re-agent to employ when you wish to remove dextrine from the infusions containing it. The action of yeast upon dextrine is very slow, but it does ultimately convert it into maltose sugar, and of course, after that, into alcohol.

The next members of our carbo-hydrate series are cane sugar and maltose. Although probably of different molecular structure, they have the same centesimal composition. I have here a sample of the small crystals called Finzel's crystals, after the sugar manufacturer of Bristol, who unfortunately has been ruined by the export bounty system of the French government, and who no longer now manufactures this product. On the whole, it is the purest sample of cane sugar that we can find in the market. Cane sugar is obtained not only from the cane plant, but also from the beet, the date and the maple tree; it may also be obtained from many other plants, but these are the principal sources. The process of manufacture is not very intricate. It consists, in the case of the cane, of pressing the juice out, and then as rapidly as possible boiling it with a small quantity of lime, in order, first of all, to precipitate the albuminous matter, and so to neutralize the acid, because we shall see presently acids rapidly convert cane sugar, which is a crystallizable body, into the sugars which do not crystallize, which chemists call inverted or changed sugars, such as ordinary molasses consists of, and the solution of course is finally treated with animal charcoal in order to decolorise it. This latter part of the process is carried out in the refineries of England.

Cane sugar, when obtained in the pure state, you all know perfectly well, but there are some two or three reactions which I think will be of some interest to you. I said a little while ago that in these carbo-hydrates the hydrogen and oxygen are in the proportion to form water, and by the employment of a little oil of vitriol, which is a substance that has a great affinity for water, it actually breaks up the molecule of sugar, and in so doing unites the oxygen and hydrogen, and forms water. That, of course, can only take place by the separation of charcoal. Mr. Lewis will add this material, which has such a power of absorbing water to the solution of cane sugar, and you will soon see the separation of charcoal. It is already black. Presently it will intumesce, and you now see, so rapid is the action, an abundant separation of charcoal, the hydrogen and oxygen having been converted into water and absorbed by the acid. This is the action of strong acid. If, instead of acting on the sugar by means of strong acid I had used strong potash, we should find very lttle change. Fehling's liquid, added to a solution of cane sugar, provided the solution has been recently made, has no action or a very slight action. The action is only due to the effect of the alkali itself upon the cane sugar. While I am heating this, Mr. Lewis will take a solution of cane sugar, and add to it a very few drops of sulphuric acid. We are not now going to convert it into charcoal, but into other kinds of sugar. You will see that this cane sugar, which has not been treated by acid has no action on Fehling's liquid. It does not reduce the protoxide of copper to the sub-oxide, yet boiling it with acid, even for a short time—and manifestly it would be much better to boil it for an hour—is quite sufficient to change the cane sugar to fruit sugar, or, inverted sugar. Having neutralized the acid by a little alkali, and heated it again with Fehling's solution, you see there is an abundant reduction from the protoxide of copper to the red sub-oxide.

This action is crought about, not only by mineral acids, but by all kinds of albuminoid bodies. Mr. Lewis will take a solution of cane sugar, and act upon it with a little malt infusion; this has the property of converting the cane sugar, to some extent, into the same products as result from the action of acids. That is the reason the West Indian planter is obliged, so soon as he has expressed the juice from the cane, to boil it as quickly as possible; were he not to do so, the acids of the juice, and the albuminoid matters, would rapidly convert the crystaline sugar into sugars that do not crystallize. These inverted sugars do not crystallize at all, and the origin of molasses in the manufacture of sugar is because, in spite of all his care—formerly, indeed, in the West Indies, very little care was taken—but in spite of even the care now taken there is always some crystallizable cane sugar converted into non-crystallizable sugars, and they come into the market in the form of molasses. Of course the larger portion of the molasses is converted into rum by fermentation and distillation. We are performing the same operation here, not by the use of the natural albuminoid bodies that exist in the plant, but by the aid of malt solution, and we have, even in so short a time, a partial conversion of the sugar solution.

The next matter to which I desire to draw your attention is, that alcohol does not precipitate cane sugar; in other words, cane sugar is soluble in alcohol. Maltose sugar is precipitated by alcohol, which is able to dissolve a very small quantity of maltose, and one is obliged to take a very large quantity of alcohol in order to dissolve the crystalline substance called maltose.

The maltose sugar to which I now pass was first discovered by Dubrunfaut, but it was forgotten until O'Sullivan, of Burton-on-Trent, again studied the action of albuminoid ferments, such as we find in malt, upon starch.

Maltose sugar differs from cane sugar in the following respects: The formula is the same, that is, the composition of 100 parts is the same, and the molecular weight is, perhaps, the same, but the properties that distinguish maltose are the following: Cane sugar only rotates the plane of polarized light 73 degrees to the right, whereas maltose rotates the ray 150 degrees to the right. It is much more dextrorotary than cane sugar, although less so than starch. We saw that Fehling's liquid had no action on cane sugar, except, however, after a time, when the alkali began to break up the sugar. It has no immediate action, but we shall find on maltose sugar Fehling's liquid produces an abundant and immediate reaction on boiling, still the amount of reduction of the protoxide of copper to sub-oxide is not so great as in the case of the next sugars we shall have to speak of, namely, the dextrose and lævulose sugars. One hundred parts of maltose sugar only produces as much action on Fehling's liquid as 61 parts of dextrose or lævulose sugars. Therefore, athough maltose has the same formula as cane sugar there is a distinct difference, first in the action on polarized light, and secondly in the action of Fehling's liquid. There is yet another difference, it is but slightly soluble in alcohol, therefore, the addition, the addition of alcohol to solutions of maltose will generally give a precipitate.

Maltose sugar is now being prepared somewhat largely in commerce, and here are some examples of it. One is the substance called O'Sullivan's dextrine maltose. It contains not merely maltose, but also dextrine. Here is another sample which is richer in maltose sugar and less rich in dextrine and has a lighter color.

[Lecture delivered December 1, 1879.]

To-night we pass on to the third sub-group, the glucoses, having the formula Cl 2 H 24 Ol 2. These are dextro-glucose and lævo-glucose. Sometimes they are called dextrose and lœvulose. They occur in fruits, and probably are due to the action of acids, or soluble albuminoid ferments, or both together, on cane sugar which has been previously stored up in the vegetable organism.

Dextro-glucose, the first member on our list, has been very rarely found in fruits unassociated with lævo-glucose. A very well known example of this glucose is to be found in ordinary honey. Honey consists of dextro-glucose and and lævo-glucose and also cane sugar. Dubrunfaut, a good many years ago, pointed out that the ratio of the dextro-glucose and glævo-glucose in honey was not that which would have occured had the product been formed only and solely from the inversion, or change, of cane sugar previously stored up. In other words, instead of being found there in equal quantities, as much of dextro-glucose as of lævo-glucose, he found there was always an axcess of dextro-glucose, which would indicate that some of the dextrose was due to the ection of some ferment, not upon sugar cane, but upon some such material as soluble starch.

As regards the preparation of dextro-glucose from honey, one of the simplest processes is to take granulated honey, and triturate it in a mortar with one eighth of its own weight of alcohol. The alcohol will dissolve out the lævo-glucose because it is more soluble; and if this be repeated once or twice, that which is not dissolved in the alcohol will consist of the dextro-glucose and a small quantity of cane sugar, or sucrose.

Another simple plan is to take the crystalline honey, and submit it to severe pressure through a calico filter. If it be pressed with considerable force, the lævo-glucose is forced out in the liquid form, and you obtain the the dextro-glucose together with the cane sugar, in the solid condition.

A much cheaper way to obtain dextrose than from honey is to convert ordinary starch into dextrose. This is done by acting upon a solution of starch with dilute mineral acid. Dextrose was first prepared in this way by the celebrated chemist, Kirchhoff. He took a solution of starch, and acted upon it with acid to the extent of 2 per cent of the water that he employed, and after keeping it at a temperature of from 80 to 90 deg centigrade, for four or five hours, he obtained the formation of this dextrose. If this acid solution be neutralized with some powdered chalk, the sulphuric acid—for it is better to use sulphuric than hydrochloric—is converted into sulphate of lime or gypsum, and on filtering you obtain a solution of the dextrose.

This dextrose is now made on a large scale. This bottle contains dextrose. This which you see here has also been made from starch, and is known commercially as glucose. I am indebted for these two specimens of dextro-glucose to the kindness of the managing director of the Manbre Saccharine Company. The way in which it is prepared generally—I do not know exactly how this sample was prepared—is to take Indian corn, which is now largely employed for that purpose by American manufacturers, or rice (which probably is the material that the Manbre Saccharine Company employ,) or to take some other starch yielding material. The rice or the Indian corn is first of all broken into a tolerably fine condition, and then is mashed with water, that is to say, it is digested or infused with water to which one per cent of oil of vitriol has been added. This is heated up by means of steam, and after some few hours, it is pumped into a boiler or digesting vessel, in which it is heated by means of steam coming direct from a boiler at 70 lbs pressure. In a short time, the steam being injected from the boiler at that pressure into this other digesting vessel, the temperature rises, and ultimately the tension of pressure in the digester is the same as in the generating boiler, and a comparatively short time is sufficient to convert the starch into dextrose; whereas, doing it as I am here, at the atmospheric pressure of 15lbs to the square inch, a much longer time is rebuired fo the purpose. So soon as the operation is complete and the operators are able to tell that from an experiment I showed you at your last meeting—you remember that alcohol preciptates solutions containing dextrine; you also remember that alcohols precipitate solutions containing maltose sugar—then, at the particular moment when alcohol fails to precipitate either the dextrine or maltose sugar, they know that they have nothing left but dextrose, because in this process, which goes on with acids, as I shall presently show you, the bodies first formed are maltose and dextrine; but ultimately the maltose is hydrated to dextrine, and the whole of the dextrin is also hydrated to dextrose; so that, so soon as alcohol fails to give a precipitate, they know that the hydration process is complete. They then run it off into large tanks; powdered chalk is added to it, in order to neutralize the sulphuric acid; the whole is allowed to settle, and the clear liquid is drawn off, and passed two or three times through animal charcoal, in order to decolorize it. The amount of decolorization, to some extent, depends on the price that is to be charged for it, and the object for which it is to be employed. Ultimately, it is evaporated down in vacuum pans; that is to say, the evaporation takes place not at 15 lbs pressure, but (by means of a steam engine constantly pumping away the steam from the evaporating vessel) at a pressure of only two or three pounds. It comes into the market in this solid form. The letter I received this morning from the manager of the Manbre Saccharine company, explained to me that it was quite easy for him to supply me with samples perfectly white. These are tinted. They have not been made at all for the purpose to which I propose to draw your attention in our next lecture. This sample was made to be used in the brewing of pale ale, but I wish to have some still whiter, because, as I shall have to point out, I propose that this dextrose shall be employed instead of potato, especially when inferior wheats are being used in the manufacture of bread.

Now, as regards the properties of this dextrose. In the first place, as the name implies, it is dextro-rotary. It turns the plane of vibration of polarized light to the right hand 56 deg. It is less soluble in water, and also in alcohol, than cane sugar, and it is only half as sweet. If you try a portion from this bottle, you will find that it is not so sweet as cane sugar; indeed it would take rather more than two parts of dextrose to produce the same sweetening effect as ordinary cane sugar. When oil of vitriol was added to a solution of cane sugar, you will remember that the cane sugar was broken up and charcoal was formed. You will find that the dextrose is more stable than the cane sugar, and that oil of vitriol does not break it up with the formation of charcoal. Mr. Lewis will kindly add some oil of vitriol to the solution of dextrose; and we shall find that there is no separation of charcoal.

While that is being done, I will pass on to the consideration of the other member of the series—lævo-glucose. This may be prepared from honey, either by the treatment of alcohol

which I have explained, or else, and much more conveniently, by the simple method of pressure. It can be produced still more cheaply from what manufacturers call inverted or changed sugar, that is to say, ordinary cane sugar inverted or changed in its properties.

If you take 100 parts by weight of inverted sugar and rub it with 60 parts of hydrated lime—ordinary quick lime hydrated with water, so as to obtain a fine dry powder—and 1,000 parts of water, at first you obtain a tolerably fluid mixture. Presently the lime reacts on the dextro-glucose and the lævo-glucose, which together constitute what is termed inverted sugar; and the whole mass solidifies. If, now, you take the solidified mass, and submit it to a very great pressure, the dextrose combined with the lime—a dextro-glucosate of lime—is pressed out. It is fluid, whereas the lævo-glucosate of lime remains as a hard solid body. Now, if you take this lævo-glucosate of lime and digest it in water, and add oxalic acid to it, the oxalic acid throws down the lime, and you obtain the solution of lævo-glucose. When prepared in this or in any other way, it has the following properties. It is called lævo-glucose, or lævulose, that is to say, it rotates the plane of polarized light to the left, 106 deg. This lævo-glucose is uncrystallizable; it is never solid; it will not solidify like the dextro-glucose, and it is as sweet as cane sugar. It is much more soluble, as I have already said, in alcohol, and also in water, than its congener, dextro-glucose.

So much for these two separately. I will now proceed to indicate the general chemical characteristics by which we can recognize glucose—not considering if it be dextro-glucose or lævo-glucose—but simply that it is a glucose.

In the first place, these glucoses reduce Fehling's solution. Mr. Lewis will take a small quantity of the dextro-glucose and add to it this Fehling's liquid, which, as I told you, consists of sulphate of copper mixed with the double tartrate of potash and soda, and rendered alkaline by caustic soda or caustic potash. When it is heated to a temporature of about 80 to 90 deg. the protoxide of copper will be reduced, and you will see the red suboxide of copper. These glucoses, whether dextro or lævo-glucose, have a peculiar action upon a solution of nitrate or chloride of cobalt. I ought to point out that cane sugar, when added to a solution of cobalt, has not the power of preventing the precipitation of the hydrated oxide upon the addition of an alkali, whereas, if we have a glucose present, then the oxide of cobalt is not precipitated from its solution by a little alkali.

On the left, we have a solution of cane sugar. Tne liquid you see is colored by cobalt, and Mr. Lewis has added a little potash to it. On the right is glucose—I do not know whether he has given me dextro-glucose, but it is of no consequence. He has now added cobalt to this on my left hand, containing a solution of cane sugar, and next potash will be added to them, and you see there is a thick precipitate formed. If this solution of cobalt is added to the solution on the right, and then potash added, we shall not obtain any precipitate. That is one means of recognizing whether cane sugar contains some glucose. but as a reaction it is by no means so delicate as that resulting from the use of Fehling's solution.

The glucoses have a very marked and powerful reducing action, and by reducing action we mean that they are able to take away oxygen from other bodies; for instance, if you take an ordinary salt that you know very well, lunar caustic, or silver nitrate, if a glucose be added to that, together with a little ammonia—or, perhaps, a more convenient and better way of performing the experiment is to add a little ammonia to the glucose solution, so as to obtain ammoniacal solution of glucose—then add silver nitrate to that, and gently warm it, the silver will be precipitated in the metallic state. When I say that, I do not mean that you will see the silver having the appearance of a shilling for it will be a black powder. Occasionally it happens that it is precipitated on the sides of the glass, so as to give a mirror like appearance to it. If that black power were put under a powerful hammer, you could force the particles together, and then they would have all the appearance of ordinary metallic silver as known to you.

Glucose has a power of changing blue indigo into white indigo, and we call that a reducing action. It is not properly a reducing action, but the expression is due to the amount of knowledge we had many years ago, when we thought that white indigo contained less oxygen then blue. We now have another theory to explain it, but all I wish you to understand is, that this powerful reducing agent can change blue indigo into white indigo on being warmed with a little alkali. You see, on warming the tube, how rapid the action is.

If I take this reduced indigo-highly colored at present because potash acts on the glucose at a high temperature, and converts it into various colored products—and put it into water containing a little acid to neutralize the alkali, you see I obtain the blue indigo again. Glucose in an alkaline solution has the power of converting a liquid that is much employed by chemists for the detection of iron in solution. It is called the red prussiate of potash, and it converts this salt into red prussiate of potash. The red prussiate of potash is reduced to the yellow prussiate of potash, or the farricyanide into the ferrocyanide. Farricyanide was poured into this tube, together with ferric chioride, or tincture of steel, and there was no reaction. Now, upon the addition of glucose to the farricyanide of potassium, it is converted into farrocyanide. Now, ferrocyanide gives with tincture of steel, a Prussian blue, whereas ferricyanide gives with tincture of steel no such Prussian blue. You see from the foregoing experiments, then, that glucose is a powerful reducing agent.

To be continued.

How to Judge of Leather Belts.

Without entering into the question of the merits or demerits of rubber or other kinds of belting, one cannot but notice the want of unanimity of opinion, even among belt manufacturers, as to what really constitutes the best leather for making belts to convey power in runniug machinery; and, if we inclnde makers of belts on the other side of the Atlantic, the differences in theory and the divergence in practice are much wider than they are here. As a rule, too, this is a matter about which machinists generally have but little information, and are, with here and there only a rare exception, but indifferent judges.

The best belt, theoretically, is that which combines the highest tensile strength with the greatest power to resist wear by attrition, being at the same time subject to little change by dryness, moisture, heat or cold. These qualities, supposing the manufacture to be ordinaryly good, are mainly dependent upon the tanning. In Europe there is very little difference known or acknowledged between good sole and good belting leather. The heaviest or "plumpest" leather is usually considered there the best for belts, as well as for the soles of boots and shoes. Our belt makers, however, recognize an essential difference. The sole of a boot or shoe, particularly in all heavy work, needs to have but little flexibility, but must have the greatest possible capacity to resist wear by attrition, and be as far as practicable, impervious to water, while it is never subjected to any test of its tensile strength.

Sole leather, therefore, in all the toughest wearing grades is made as thick and solid as the tanner can make it; great care is taken to open wide the pores of the hide, in the early part of the tanning process, see that all the, gelatine is saved to combine with tannin and that the hide is left in the tan liquors long enough to take up all tho tannin it will absorb. This makes the finished leather oftentimes a great deal thicker than the original hide. But such leather, it need hardly be said, would not be the best for making belts, for it has little flexibility, and its tensile strength has been greatly impaired by the straining of the fibers of the hide to take in the large amount of tannin it has received.

The tanner who would make the best belt-leather, however, although he cannot swell the fibers of the hide with tannin to the extent above noted, must produce a firm, solid belt with not a little of the elasticity and strength of steel; it must be sufficiently flexible, and yet of great power to resist wear by attrition, and to stand, with little stretching, the heaviest direct strain. These qualities are best obtained by an amount of tanning which will make the finished leather but little thicker than the raw hide of which it is made. On cutting a piece of sole or belting leather, one will notice the network of hide fibers interlacing each other, and which, before tanning, were surrounded with gelatine. These fibers give the hide its great tensile strength, and any considerable displacement of them by the transformation of the hide into leather impairs this quality. A piece of good belt leather, therefore, when freshly cut, should look bright, with the intervening spaces between the fibers fine, even and regular. The texture should be uniform throughout, and with the utmost solidity there should be great elasticity.

The Steel Age.

Every day steel is supplanting iron for some one of the numerous purposes to which that metal has hitherto been applied. Iron rails are already replaced, or soon will be, by steel rails on every considerable railway in the land. In a paper read before the Iron and Steel Institute, it was stated that many of the British lines could not have paid more thon half the dividends they now make if it had not been for the development of steel rails and steel tires. The opinion is gaining ground among ship builders that a framework of steel for vessels would be superior to iron, being a lighter material in proportion to its strength. It is evident that the coming century is to be an age of steel. Upon the perfection of metal, and its adaptability to the various uses to which it may be put, the safety of the modern traveller must largely depend. Whether he is rushing over the surface of the earth on an express train at the rate of fifty miles an hour, or driving three hundred and fifty miles a day through the ocean on a transatlantic steamer, he wants to rest assured that science has done all it can to make his journey safe,

The above remarks were suggested by the opinion expressed recently at the Iron and Steel Institute in Liverpool, that the tests required at present for steel were too stringent and severe. But it was answered that the trayeller would not feel as safe as he does were the tests of steel deminished in severity. Criticism was chiefly directed to the tests applied by the Lloyds Admiralty to steel used in ship building only; but it is probable that if stringency is related in one direction, it will be in all. The argument was that although steel makes a better framework for ships than iron, it will not be employed at present, because it must undergo tests proportionately much more severe than those to which iron is subjected—in other words, the manufacturers, or some of them, contend that under much lighter tests than those now required steel framework would be quite as strong as the iron framework which the authorities constantly approve. But this may be an argument against the sufficiency of the iron tests rather than against the stringency of the steel test.

Whether it is or not, however, Dr. Siemens, than whom no man ought to be more competent to speak on the subject, pointed out a difference between iron and steel which appears to justify the maintenance of the severest tests. Iron, he said, always holds together, except when fractured by a blow under peculiar circumstances; its tendency is to hold together when struck or strained, whether it is good or poor quality. But this is not the case with all steel. The best steel, it is true, will bend like leather rather than break; but anything inferior to that quality is far more liable to disastrous fracture than iron. Whence, said Dr. Siemens, do not deminish the tests of steel, but rather increase there severity.

Practically, this positive expression of opinion from so high an authority settles the question for the time being. We do not mean that there was no dissension from the views of Dr. Siemens, but none of the steel tests under consideration are likely to be relaxed in opposition to his emphatic advice. As the maintenance of a high standard of excellence in Great Britain is conducive to the maintenance of a like standard in this country, we regard this result with content.

The Struggles of an Inventor.

Erastus B. Bigelow, the inventor of the carpet loom, who died a short time ago in Boston had a very long and hard struggle before he attained the success that was his object. His life furnishes a fitting example for every young man.

His father was very poor and the boy was set to work on a neighbor's farm with very small wages. When thirteen years old he made his first invention—a hand loom for weaving suspender webbing. Next he invented a machine for spinning yarn which brought him in a few hundred dollars but was not long in use.

When sixteen years old he attended an academy at his own expense, and soon after wrote a book on stenography. In his book enterprise he was left $400 in debt. Next he took a partner and began the manufacture of twine. Later he went to Wareham, Mass., to manufacture cotton, but failed and increased his indebtedness to $1400.

He then came to this city and took lessons in penmanship and soon became so skilled that he gained a living by giving instruction. But this wandering existence did not satisfy him and he returned home, and after taking a course in classical studies he entered his name as a student of medicine.

His thirst for knowledge again led him to invention, and sleeping one night under a Marseilles quilt he conceived the idea that a power-loom might be made to weave such fabrics. Suspending his studies he soon made a loom which worked satisfactorily. He arranged with a Boston house for the needed capital, but unfortunately the firm failed.

Mr. Bigelow then began the invention of a loom for weaving coach lace, after satisfying himself that there was a sufficient demand for the goods. This invention, which required six weeks of extraordinary mental application, gave him a reputation, and times became better with him.

From this time he turned his attention to carpet machinery, and in 1845 he perfected a loom for weaving two-ply ingrain carpet, and he started in Lowell, Mass., the first successful power-loom factory ever in operation. His chief invention—the power-loom for weaving Brussels carpet, was completed a few years later. His patents on it were purchased by an English firm for $100,000.

The whole number of patents issued to Mr. Bigelow is thirty-six. By his inventions the cost of weaving coach lace was reduced at once from twenty two cents a yard to three cents; and the cost of weaving Brussels carpet from thirty cents to four cents.—*New York Post.*

Milling in Minneapolis.

Secretary Sturtevant has compiled for the annual report of the Board of Trade the following table, showing the milling capacity of Minneapolis:

Name of mill.	Built.	Rebuilt.	Capacity.
Cataract	1860	.....	350 bbls
Humboldt	1875	1878	600 "
Pettit	1876	1878	800 "
Minneapolis	1865	.....	500 "
Palisade	1873	.....	500 "
Zenith	1871	1878	500 "
Union	1861	.....	250 "
Northwestern	1862	1879	600 "
Arctic	1861	.....	250 "
Anchor	1874	1879	500 "
Empire	1872	.....	500 "
Pillsbury	1865	.....	500 "
Excelsior	1877	.....	500 "
Model	1877	.....	250 "
Phœnix	1875	.....	200 "
Washburn A*	1874	1880	3,000 "
Washburn B	1878	.....	1,200 "
Washburn C	1866	.....	800 "
Holly	1872	.....	200 "
Galaxy	1874	1875-9	700 "
Crown Roller*	1880	.....	2,400 "
Dakota	1867	.....	250 "
North Star	1870	.....	250 "
Trade†	1879	.....	100 "
Standard	1879	.....	1,000 "
Capacity in barrels for 24 hours			16,700

*Not yet completed. †Steam mill.

The various mills are owned as follows:

Owner's name.	Name of mill.
D. R. Barber & Son	Cataract
Bull, Newton & Co	Humboldt
J. A. Christian & Co	Pettit
Crocker, Fiske & Co	Minneapolis
Leonard, Day & Co	Palisade
Day, Rollins & Co	Zenith
G W Goodrich & Co	Union
Fletcher, Sidle & Holmes	Northwestern
Hobart, Shuler & Co	Arctic
C. A. Pillsbury & Co	Anchor
C. A. Pillsbury & Co	Empire
C. A. Pillsbury & Co	Pillsbury
C. A. Pillsbury & Co	Excelsior
Russell, Hinelein & Co	Model
Stamwitz & Schober	Phœnix
Washburn, Crosby & Co	Washburn A
Washburn, Crosby & Co	Washburn B
Washburn, Crosby & Co	Washburn C
W. H. Hinkle & Co	Holly
Cahill, Fletcher & Co	Galaxy
Christian Bros. & Co	Crown Roller
H. F. Brown & Co	Dakota
H. J. G. Croswell	North Star
Hawthorne Bros	Trade
E. V. White & Co	Standard

The Standard, Northwestern, Galaxy, Trade, Washburn A, and Crown Roller Mills have been built during the past year, though the last two named are not yet completed. They will probably start up with about one-half their capacity during the present year—but it is doubtful whether they will be completed so as to grind this year's crop. But their full capacity will probably be supplied at an early day, and even should this not be the case, when all the mills are running the product will be 14,000 barrels per day, sufficient to load seven trains of twenty cars each daily. The season at the mills has been a busy one. The Washburn C has been started up after a thorough overhauling; the Minneapolis mill has been extensively repaired and added to; the work of changing the Excelsior mill to the roller system has already been inaugurated, and other of the mills have undergone extensive repairs. It is no secret that other milling enterprises are contemplated, and another year will probably witness a very material increase of the product of the mills. The almost fabulous amount of 20,000 barrels per day is already within sight. It is estimated that the mills of Minneapolis will consume during the coming season 15,000,000 bushels of wheat, fully a third of the whole estimated product of the State. The other mills outside of Minneapolis will consume about the same amount. Minnesota is rapidly reaching the point where she will have no grain to export.—*Minneapolis Tribune.*

GALILEO'S discovery of the pendulum was suggested to his observant eye by a lamp swinging from the ceiling of Pisa Cathedral.

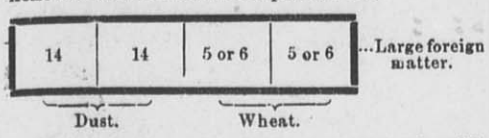
High Grinding.

[Translated by special permission, from Professor Kick's DIE MEHLFABRIKATION, for the *Corn Trade Journal and Millers' Gazette*, London, England.

NUMBERS OF WIRES AND SILKS USED FOR DRESSING IN THE DIFFERENT STAGES OF THE AUSTRIAN HIGH-GRINDING SYSTEM.

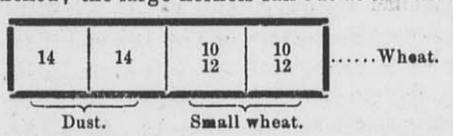
THE following statement of numbers are quoted from instances where they are in actual use; they would, however, vary slightly in different mills.

To clean wheat or rye from dust, small seeds, and large foreign matters, the first Kopp-cylinder, or cylinder for black dust, is used, the same consists as shown by the annexed sketch of four compartments:



The first two of which are covered with brass wire No. 14, and the two latter with No. 5 or 6 of the same material. Dust and small seeds fall through the two first partitions, wheat or rye through the last two, and large foreign matters pass over the wire and fall out at the end.

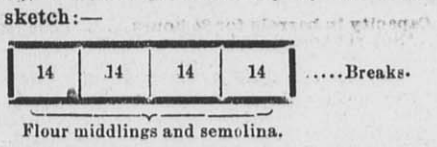
The wheat thus cleaned goes to the smutters, thance back again to a "smut cylinder," which lets dust loosened by the smutter through the first two partitions, and the small wheat mixed with small foreign seeds through the last two. For wheat No. 10 wire would be used, for rye No. 12, as shown in the sketch annexed; the large kernels fall out at the end.



The smutted wheat is passed through the ending stones, and then goes to the "cylinder under the ending stones," which is entirely covered with No 14 wire, and separates the dust from the ended wheat.

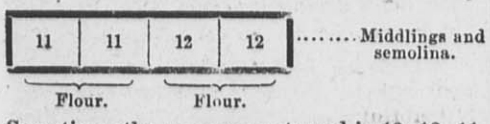
The operation following the ending is the cracking process, in which the wheat is broken into several parts of different sizes. The largest of the particles so made, viz., the breaks, are taken out by the "sorting," or break cylinders; these are used of two sizes.

The *short sorting*, or *break cylinder* (length 7 feet), is described sufficiently by the following sketch:—



The *long sorting*, or *break cylinder* (length 12½ feet), is clothed in the first three divisions with No. 32 wire, if running at a slow speed, and No. 28 if revolving quickly. Particulars of covering are as follows:

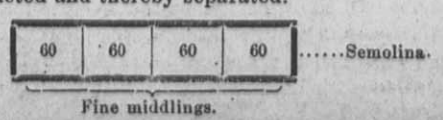
The mixture of flour, middlings, and semolinas goes into the flour cylinder (length 12 feet), which takes ont the flour and lets semolina and middlings go over the end. The first two divisions are clothed with No. 11 or 12 silk, the latter with No. 12 or 13 respectively.



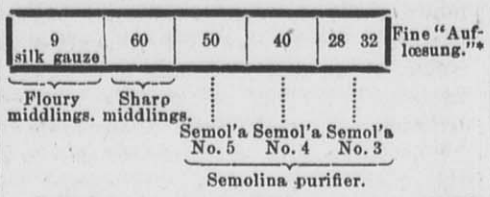
Sometimes the arrangement used is 12, 12, 11, 11, or 12, 11, 11, and 10; the above covering is, however, preferable, as it allows a more uniform fineness of flour to be made, because at first, when there is a larger quantity of flour on the silks, flour as fine will pass through the coarser meshes as further on through the finer sheets. For this reason combinations similar to the above can be used profitably; for instance, Nos. 12, 13, 14, 15, or Nos. 13, 13, 15, 15. If a small breaking cylinder is used before the silk reel, the coarser semolina also would pass through the former, and thereby the silks would have more work to do than if this had already been separated by means of the large separating or break cylinder. It is therefore advisable to use the latter, in order to lessen the wear of the silk.

In some mills a special cylinder is used, for separating the middlings, the

Fine middlings cylinder, through which the mixture of middlings and semolina is conducted and thereby separated.



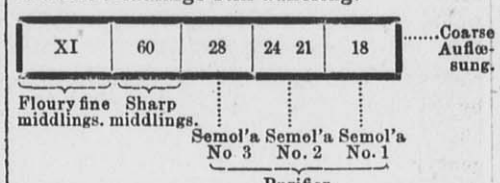
It is, however, more usual to lead the mixture ture mentioned from the flour cylinder direct to a cylinder situate in the purifier room above the purifiers. The cylinders of the purifying room differ according as they have to separate fine semolina and fine middlings, or coarse semolina. The following are therefore distinguished:—



Cylinders in the purifying rooms suitable for *fine semolinas and fine middlings* (semolina cylinder).

The first division is clothed with silk gauze No. 11, and allows floury fine middlings to fall through, which passes later on through a flour cylinder to separate the flour. The second division is clothed with No. 60 wire, or No. 6 silk gauze, and separates the sharp middlings, while the three last divisions let the semolinas, Nos. 5, 4, 3, fall through, which pass on to the semolina purifier standing immediately underneath it, in the three compartments of which the three numbers are purified separately.

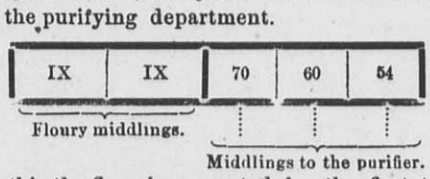
The cylinder for coarse semolina (semolina cylinder) is the same in the first two divisions as the above, in order to separate the flour and fine middlings still adhering.



The three last divisions, having Nos. 28, 24 (or, if running at a higher speed,) 21, and 18, separate the coarse semolina, which falls into the purifier underneath.

As the semolinas must go through the purifier repeatedly, and all the flour and fine middlings would not be dressed out before they pass through the purifier the first time, similar reels are used over the purifiers before the second and third purifying; the same would be covered for the second purifying of the *fine* semolinas with Nos. X, X silk and 50, 40, and 32 wire, for the third purifying with No. IX silk and 60, 50, 40, and 32 wire, and for coarse semolinas, for second and third purifying, with No. IX silk and 60, 28, 24, and 18 wire.

In the same way as the semolinas are freed from light bran, this is also done with the fine middlings, and here also a reel is used over the purifier, viz., the cylinder for fine middlings in the purifying department.



In this the flour is separated by the first two sheets, and through the last three sheets the middlings are graded into three sizes, each of which is treated separately in a compartment of a purifier for fine middlings. By this separation it becomes possible to regulate the strength of the air current to suit the material exactly.

Instead of the semolina and middlings reels here mentioned, riddles are often used over the purifiers, which allow of an easier exchange of the sieves, but their capacity is only about one-third that of the reels.

The following are distinguished:—

Riddle for fine semolinas covered with wire No. 50, 40, 32.

Riddle for coarse semolinas covered with wire No. 28, 24, 18.

Riddle for fine middlings covered with wire No, 70, 60, 54.

Because of the small sifting surface of these shakers, it often happens that with too much material on the riddles the separation is very imperfect, and that, for instance, through No. 40 wire a part of the material falls that should have already gone through No. 50, but when this is the case the action of the purifier is also imperfect, because the air current cannot be exactly adapted to the size of the particles.

*) "Auflœsung" are somewhat smaller than breaks.

(To be continued.)

HIS DEFENSE.—The Judge (severely): "Prisoner, you are accused of attempting to murder your mother-in-law. What have you to say for yourself?" Prisoner (apologetically): "Yes, sir; but my failure to do so is to be ascribed to causes entirely beyond my control." The Judge (blandly): "Oh, that alters the case. I shall suspend sentence, but you will not get off so easily if you are brought here again under similar circumstances. Gendarme, show this gentleman out.—*French paper.*

Misnamed Things.

The misaplication of a name in speaking of the common things of life is the source of many errors. Why things are not correctly named is probably due to the deficiency of our language in descriptive words. The *Journal of Applied Science* has this to say upon this subject:

Why should trade not have a Johnson to classify and correct the mass of inconsistencies that go to make up its nomenclature? We not only tax our brains to invent "fantastic" names for every new fabric, varied, perhaps only by a thread or shade from what our grandparents wore a century ago, but there are in use positive misnomers for many staple articles of merchandise. The following imperfect list, culled from sources already at hand, will give a faint idea of them:

Acid (sour), applied in chemistry to a class of bodies to which sourness is only accidental, and by no neans a universal characteristic. Thus rock crystals, quartz, flint, etc., are chemical acids, though no particle of acidity belongs to them.

Blacklead does not contain a single particle of lead, being composed of carbon and iron.

Brazilian grass does not come from Brazil, or even grow there; nor is it grass at all. It consists of a palm leaf (Thrinax argentea), and is imported chiefly from Cuba.

Burgundy pitch is not pitch, nor is it manufactured in or exported from Burgundy. The best is a resinous substance prepared from common frankincense, and brought from Hamburg; but by far the greater quantity is a mixture of resin and palm oil.

China, as a name for porcelain, gives rise to the contradictory expression—British china, Dutch china, Chelsea china, etc., like wooden milestones, iron milestones, brass shoe horns, iron pens, steel pens.

Cuttle bone is not bone at all, but a structure of pure chalk, once embedded loosely in the substance of certain species of cuttle fish. It is enclosed in a membraneous sac within the body of the fish, and drops out when the sac is opened, but it has no connection whatever with the sac of the cuttle fish.

Galvanized iron is not galvanized. It is simply iron coated with zinc; and this is done by dipping it in a zinc bath containing muriatic acid.

German silver is not silver at all, nor was the metallic alloy called by that name invented by a German, but has been in use in China time out of mind.

Honey soap contains no honey, nor is honey in any way employed in its manufacture. It is a mixture of palm oil soap, and olive oil soap, each one part, with three parts of curd soap, or yellow soap, scented.

Japan lacquer contains no lac at all, but is made from the sap of a tree called Rhus vernicifera.

Kid gloves are not usually made from kid skins, but of lamb or sheep skins. At present many of them are made of rat skins.

Meerchaum is not petrified "sea foam," as its name implies, but is a composition of silica, magnesia and water.

Mosiac gold has no connection with Moses or the metal gold. It is an alloy of copper and zinc, used in the ancient musivum or tesselated work.

Mother of pearl is the inner layer of several sorts of shells. It is not the mother of pearl, as its name indicates, but in some cases the matrix of the pearl.

Pen means a feather (Latin, penna, a wing). A steel pen is not a very choice expression.

Prussia blue does not come from Prussia, but is the precipitate of the salt of protoxide of iron with prussiate of potassa.

Salid oil is not oil for salid, but oil for cleaning salades, i. e., helmets.

Salt is not salt at all, and has long been excluded from the class of bodies denominated "salts."

Sealing wax is not wax at all, nor does it contain a single particle of wax. It is made of shellac, Venice turpentine, and cinnabar. Cinnabar gives it a deep red color, and the turpentine renders the shellac soft and less brittle.

Sperm oil properly means "seed oil" (Latin, sperma, seed), from the notion that it was spermaceti (the sperm or melt of a whale). The sperm whale is the whale that gives the "seed oil," which is taken chiefly, but not wholly, from the head.

Whalebone is not bone at all, nor does it possess any of the properties of bone. It is a substance attached to the upper jaw of the whale, and serves to strain the water which the creature takes up in large mouthfuls.

Rhinoceros horn is not horn at all, but a kind of matted or compact hair, and is only like a horn from being a protuberance on the animal's head.

Salt on Wheat Lands.

The *Prairie Farmer* of Chicago has been investigating the subject of using salt as manure on land. As this question comes up every once in a while we would like to hear from our readers on the subject. One question we would like to ask of those who have used it is this: Does the sowing of salt on fields effect the health of those residing near. It has been claimed that the use of salt in winter on sidewalks and on street car tracks has almost invariably been succeeded by sickness in the vicinity where it was used. Diptheria and typhoid fevers are claimed to have been started in New Yoak city by salt used on the street car tracks. We qnote the article below from the *Prairie Farmer*.

"Occasionally we have an inquiry in regard to using salt as a fertilizer. In nearly all ages and countries, salt has been used as a manure. While it acts as a feeder to plants, it performs the office also of a solvent, dissolving, in the fluid state, other substances, and, rendering them available as plant food. But it should be used with care, especially in a dry season, or in dry climates, where the rainfall is deficient. It should never be applied directly to plants, although sometimes it is applied to cabbages to hasten their heading, and render them more solid.

The Farmers' Club of Rio, Wisconsin, had before it for discussion recently, the subject of salt as a fertilizer, and a friend sends us a brief report of what was said on that occasion, which we give for the benefit of those who desire to learn the experience of farmers who have used it for that purpose. The result seems to have been highly satisfactory.

Mr. Seth Allen opened the discussion by giving his experience in the use of salt upon his land; and stated that he had first used it on his farm eight years ago, and that it added fully 50 per cent. to his yield of wheat that year. That for a year or two thereafter he did not use salt, on the account of the cost; but that he became thoroughly satisfied that a free use of salt was indispensable to the success of his farming operations; and that he has used it every year since, resulting in increased crops of grain of improved quality, —his wheat from salted land never grading below No. 2, while that from unsalted land was inferior in both quality and quantity. At first he had used at the rate of one barrel of salt to three acres, but now uses one barrel to two acres.

Other members, in giving their experience and observation, fully corroborated all that Mr. Allen had said in behalf of the use of salt as a fertilizer; and, after a full consideration of the subject, the conclusions arrived at were as follows:

That salt has the property of hastening the maturity of all grain crops; that wheat on salted land will ripen six to ten days earlier than on unsalted land, all other conditions being equal.

That it increases the yield from 25 to 50 per cent. That it stiffens the straw, and prevents rust and smut. That it checks, if it does not entirely prevent, the ravages of the chinch-bug; and that there is no danger of a man's pocket permitting him to put too much salt upon his land, as two barrels per acre will injure no grain crop.

In answer to questions as to the best time and manner of sowing salt, as also the proper quantity to use, the following answers were given:

The best time to sow salt is in the spring; and it ought to be the first thing done on either fall or spring plowing, as all the after-stirring of the land assists in its equal distribution through the soil. The best and easiest method of sowing salt, in the absence of a machine for that purpose, is to sow it from out of the rear end of a wagon,—the sower using both hands, while the team is moving at a slow walk. In this way, thirty to forty acres can be sowed in one day.

The quantity used may be from 150 to 300 pounds per acre; but the greater quantity is the better.

HOW BUFFALO BILL GOT HIS NAME.—William F. Cody thus explains how he came to be called "Buffalo Bill:"

In 1867, when the Kansas Pacific road was being built, I was in the service of the Government. One of the managers of the road came to me and said the men were out of meat, and asked me what I would contract to furnish twenty-five buffaloes a day for. I told him I was in the service of the Government and could not work for him at any price.

The company however, made an arrangement with the Government so I got off, and he hired me at $500 a month to shoot buffaloes. I thought $500 a month was the biggest salary any man ever received. I went to work, and in eighteen months I killed 4,280 buffaloes.

The "Paddys" employed on the road, as a consequence, became very tired of buffalo meat. When they saw me coming, they knew my appearance heralded a fresh supply of tough buffalo meat, and they said one to another, "Bedad, here comes Buffalo Bill again; sharpen up your grinders, we'll have more buffalo meat now." I soon became known along the entire line of the Kansas Pacific as "Buffalo Bill.—*New York Post.*

GALVANI observed that a frog's leg twitched when placed in contact with different metals, and it was this apparently insignificant fact that led to the invention of the electric telegraph.

Beauty Unadorned.

The following article copied from the New York *Sunday News*, may serve to show the length to which lovers of true art will sometimes go to attain perfection:

At a meeting of the Photographic section of the American Institute, on Tuesday, Mr. Oscar G. Mason, official photographer to Bellevue Hospital Medical College, exhibited magic lantern pictures of a very mysterious young lady. In explanation he said there exists in this city a very private and select coterie, or organization, which may be called the Artistic Medical Club. It consists of thirteen or fourteen members, each one of whom is a physician. A specialty with them is the study of the human form in its most perfect development, and to get the best attainable living model has been a leading ambition with them. One of them bethought himself of a young lady having an admirably proportioned figure, and mentioned the fact to his colleagues; but how to get her to "sit" for an artist in the various positions required seemed for a time an insurmountable difficulty. She belongs to the very best society, and her feelings, as well as those of her family, would naturally revolt at any proposition to that effect. The medical gentleman thought by a little *finesse* he could get over the difficulty. He was the family physician, and as such had exceptional privileges accorded him. He made certain measurements, comprising the young lady's hight, size of waste, etc., and found them all to approach remarkably close to the ideal standard of correctness. The greatest deviation from that standard did not exceed the sixteenth part of an inch. The young lady never wore corsets, tight shoes or any of the cramping articles that go to make a fashionable lady's make-up, and was in consequence the embodiment of health as well as a model of grace and symmetry.

The physician who undertook to get pictures of this charming person took an opportunity to broach the subject to her parents, explained to them that it was in the interest of art, and that the whole would be done with the utmost delicacy possible.

They mentioned the matter to their daughter, who refused at first to listen to their proposition. But after several months of negotiations between her parents and the doctor, she yielded consent on certain conditions, some of which were the following: That the artist who "took" her should never see her face so as to be able afterward to recognize her; that he should only be accompanied by one other gentleman, who should be a physician and a member of the club, and that she should be accompanied by two lady friends.

On the stipulated conditions she allowed herself to be photographed in various attitudes, her face alone being concealed by a heavy vail or drapery, and the artist to this day does not know who she is.

CLEANSING MILLSTONES.—Yarn's process of cleansing mill-stones consists in the application of a commercial article known to the trade as "hydrofluoric acid," sometimes called "fluoric acid," to the grinding surface of millstones, for the purpose of cleansing them of glaze, and at the same time opening the pores or granulations. The stones are first placed in horizontal position, face upward, and after being dusted, or washed, if necessary, hydrofluoric acid is used as a coating for the entire face. After the acid has remained upon the stone a sufficient length of time to remove the glaze, it is washed off with water, and the stone is ready for use. The acid is applied to the stone at different points, and spread with a brush over the entire surface. It is then allowed to remain from thirty to fifty minutes, according to the kind and condition of the stone. The glaze it will be found, is not only removed, but the granulations of the stone will appear in perfect condition for work, and that without the use of a pick or other instrument. Ammonia with fluoric acid or ammonium-fluoride or other combinations with fluoric acid as an element, may be used.

WHAT IOWA GIRLS ARE TAUGHT.—At the Iowa Agricultural College every girl in the the Junior class has learned how to make good bread, weighing and measuring her ingredients, mixing, kneading and baking, and regulating her fire. Each has also been taught to make yeast and make biscuit, puddings, pies and cakes of various kinds; how to cook a roast, broil a steak, and make a fragrant cup of coffee; how to stuff a roast turkey, make oyster soup, prepare a stock for other soups, steam and mash potatoes so that they will melt in the mouth, and, in short, to get up a first-class meal, combining both substantial and fancy dishes, in good style. Theory and manual skill have gone hand in hand. If there is anything that challenges the unlimited respect and devotion of the masculine mind it is ability in woman to order well her own household.

PROGRESS OF NEBRASKA.—The rapid growth and development of Nebraska excite the envy of California, which is making very striking comparisons between herself and the newer State. Nebraska is not half so large as California; she did not become a State until the other had made great advance in wealth and population. She had not 20,000 white inhabitants when California had near 500,000. Six years ago her grain product of all kinds was only 10,000,000 bushels, and last year it was 100,000,000, against the Pacific States 65,000,000. Her cultivated area is now estimated at 4,000,000 acres, against 3,700,000 odd acres in California. Since 1860 the population has increased 800 per cent, while the other state has increased in the same time but 150 per cent. Nebraska's grain yield was last year 20,000,000 bushels more than during the previous year, wholly due to the increase of farm and settlers, of whom there were 100,000 and more in 1879. The increase of live stock the same year was 69 per cent, and of hogs 60 per cent. The present white population is fully 500,000. California's is less than 1,000,000. The principal town—Omaha—has kept pace with the growth of the state, having added 1,000 new buildings last year; having shipped 6,000,000 bushels of wheat, received 300,000 head of live stock and $60,000,000 of bullion and precious ores, while its banking transactions reached $200,000,000. Eight years since its population was not above 5,000; now it is fully 40,000, and it has the commercial and manufacturing importance of twice that number. The cause of the superior growth of Nebraska must be sought in her cheap land, small farms and competition in freights. California is kept back by land monopoly and monopolists and any quantity of rings and rings within rings. It is within reason to say that no state in the Union, with half the natural advantages of California, is so retarded by the selfish schemes of a few hundred men resolved to amass immense wealth at the expense of the community, and continually and successfully carrying out their resolutions.—*New York Times.*

AN ingenious copying apparatus was described at the September meeting of the Franklin Institute, under the name of "Bartelet's Duplicator." The design of the apparatus is to enable one to take a number of copies of letters, notes, documents, circulars, drawings—in short, of anything written with a pen, and with any colored ink that may be desired, or in a variety of colors, as may be wished with drawings. The apparatus, which is exceedingly simple, consists of a sheet of firm jelly, prepared according to the following recipe, namely: Galatine (or glue), 1 part, by weight; swell in 2 parts of cold water; render liquid by gentle heat: add 4 parts of glycerine, a few drops of carbolic acid (as a preservative against putrefaction), and enough whiting to give a milky appearance to the mass. This mixture is poured into a shallow trough, or form of wood or metal, which is usually furnished with a hinged cover or lid, and clasp, to close it up when not in use. The operation of copying is as follows: The copy, letter, drawing (or whatever it may be) is made on ordinary paper, with a tolerably thick aniline ink, and, when set, it is laid face downward on the jelly, and gentle pressure applied to bring all parts of the copy in good contact. It is then peeled off, and will be found to have left a perfect transfer on the gelatine plate. To copy from this it is only necessary to lay a sheet of paper over the transferred impression on the jelly, pass the hand over it well a couple of times, and peel it off as before, and the result will be a perfect duplicate of the original. By this simple means from thirty to fifty copies can be made almost as fast as the paper can be laid down and removed. When the copies begin to show signs of becoming faint, a fresh original must be prepared (or the first original may be used again if a thick pen and plenty of ink have been used in making it); the impression must be washed out of the jelly with a sponge and cold water and a fresh transfer made, which can be printed from as before. When the jelly surface receives an injury it is easily brought to a smooth. level surface by melting it down over a flame or in an oven. Before used after this, however, a sponge dampened with cold water should be applied to the surface.

This is the same thing that is being manufactured and extensively advertised over this country by the "graphs" and "grams" companies, and which is meeting with large sales.

California Mining Interests.

The Eastern press, with few excepsions, seems determined to ignore California in every allusion made to the mining future of the West. Whether the cause is founded upon the notion that California mines are worked out, or that Eastern capital has become so largely "stuck," so to speak, in the carbonate fields, is immaterial to the fact that our state is in many respects as utterly disregarded as if it did not exist. The golden exaggerations of some other States and Territories, when touched with expert finger of the statistician, fall so far below even mediocrity that it is a surprise that such fabulous accounts should ever have been credited. We ought not to say that the credibility, or rather gullibility, of the Eastern press should be so easily imposed upon, for the reason that it is a trite saying that "Distance lends enchantment to the view." The inaccessibility of the mines in the comparatively new regions of the West affords a foundation for the truthfulness of the accounts of rich discoveries proportionate to the difficulty of arriving at the exact truth. The wonderful accounts of Sinbad the Sailor were very ordinary ones when compared with those of Munchausen. No person had been present who could dispute the relations of either, and so they were regarded as solemn truth by their hearers because they were indisputable. For the same reason, many of the Eastern press are in possession of the truth *a la* Munchausen. California is now quite accessible, and the charm of adventure and mystery attending the prospecting for the precious metals has dispelled the charm and diminished the claim of the marvelous, which has moved to other regions still unexplored.—*San Francisco Mining and Scientific Press.*

A GOOD story is told here this season about an estimable Quaker lady who kept a boarding-house on Pearl street. As everybody knows, the Friends are wont to speak of people without prefixing titles. Elizabeth Hussey has had so many boarders that she has been obliged to lodge them out at other houses, belonging to Messrs. Bates, Coffin & Folger. The other day, a party consisting of a dozen or so Baltimoreans, who had been recommended to go to go this lady's, arrived, and at once repaired to her residence. "I can give thee all bread," said she to the Marylanders, "but thee must sleep in Coffin's." "What?" cried the amazed spokesman. "That is the best I can do for thee, and if thee don't like, thee can go elsewhere." And the indignant visitors went.

A BURGLAR-ALARM is not only a capital thing for waking whole families up unexpectedly in the dead of the night, but it has also been known to act as a moral agent. A well-known banker, whose son was at home from Harvard for the holidays, came down the other morning in great perturbation of mind and ordered the butler to send a man at once to adjust the burglar-alarm, "for," said he, "it didn't work last night, when Charles came in late." "Oh! if you please, sir," said the gentle housemaid, standing by, "Master Charles came in this morning as I was sweeping the steps."—*The Hour.*

"JUST now, in at Smith's," said Jones, his face flushed with the proud consciousness of a good deed done, "my honesty had a severe strain. A fellow went out just after I came in, and I noticed he left half a dollar of his change at the counter. My first thought was to pocket it. Sorry to say it, boys; but it is a fact. I didn't, though, thank heaven! No; I just put my fingers near it, when Smith handed me my cigars, and, by a curious coincidence, it was just the right change. Seemed sort o' providential, didn't it? Yes," he continued, "there's no doubt about it; honesty *is* the best policy."—*Boston Transcript.*

SAYS a dealer: "Owing to the unprecedentedly mild weather we are selling skates with life-preservers attached, at prices charged by other dealers for skates alone. The prices are so reasonable that we feel assured that all purchasers will fall in with them. The recent melancholy cases of drowning of persons unprovided with our self-floating, shore-returning skates, should be a warning not to purchase for a gift to any friend that we would not like to see drowned any skate but that we advertise."

SO TRIFLING a matter as the sight of seaweed floating past his ship enabled Columbus to quell the mutiny which arose among his sailors at not discovering land, and to assure them that the eagerly-sought new world was not far off.

A SPIDER'S net suspended across the path of Sir Samuel Brown, as he walked one dewy morning in his garden, was the prompter that gave to him the idea of his suspension bridge across the Tweed.

WHILE a bad observer may "go through a forest and see no firewood," a true seer learns from the smallest things and apparently the most insignificant people. "Sir," said Dr. Johnson to a fine gentleman just returned from Italy, "some men will learn more in the Hampstead stage than others in the tour of Europe."

WELLINGTON'S achievements were mainly owing to the fact that he personally attended to such minutiæ as soldiers' shoes, camp kettles, biscuit, horse fodder; and it was because Nelson attended to detail in respect of time that he was victorious. "I owe," he said, "all my success in life to having been always a quarter of an hour before my time."

PROGRESS AT JERUSALEM.—The fact that a steam engine is being erected at Jerusalem is a startling announcement, but it is an evidence of the progress of civilization. The "infidels" who have thus introduced modern inventions to the "Holy" city are a firm of Wurtemburg colonists, who, with the characteristic enterprise of the Teutonic race, are doing all the Oriental powers will let them to make the historic and Old World city march with the times.

MUNGER, WHEELER & Co. will at once proceed to erect a six-story elevator on the corner of Lumber street and the river, South Branch, Chicago, and it is certain that the structure will be a first class elevator in every particular. The contemplated new building is to cover an area of 354x100 feet, and it is to be 135 feet in height. The elevator will be capable of storing about 1,500,000 bushels of grain. It is contemplated to have the new building in order for business by the first of October, and the estimated cost is about $350,000.

COLLECTING SMALL CLAIMS.—Germany has a system of collecting small claims through her postoffices, which has been so successful that France adopted it last summer. The charges are from 10 to 20 cents for each collection. During the first forty-five days the system was in operation 132,000 bills of exchange and notes were received for collection and about three-fourths of the amount of money they called for was collected. The number received during the last two weeks of that period was nearly double that of the first fortnight. The average amount of these claims was $3.88.

STEPHEN ROPER gives the following rule for finding the safe working pressure of steam boilers: Multiply the thickness of the iron .56, if single riveted, and .70, if double riveted; multiply this product by 10,000 (safe load); then divide the last product by the external radius (less thickness of iron); the quotient will be the safe working pressure in pounds, per square inch. Example:—

Diameter of boiler, 42 inches.
Thickness of iron, ⅜ inches.

2) 42
21 external radius.
.375
20.625 internal radius.
Thickness of iron, ⅜=.375
.56 single riveted.
.21000
10000 safe load.
20 625) 2100.00000
101.81 lbs. safe working pressure.

SHIPPING GRAIN IN BAGS.—A recent Liverpool paper has this to say under the head of "Disasters to Cargo Steamers," viz: In consequence of the great loss of Atlantic cargo steamers within the past three months through cargoes of wheat in bulk shifting and causing them to capsize and founder, there is not only an extensive movement in the North of England on tho part of the shipmasters, but also among iron-steamship owners themselves, who are their own underwriters, to put an end to the mischief. Mr. W. Dickinson, of the Quayside, Newcastle, an extensive iron-ship owner, has got the support of a large number of owners, and at the next annual meeting of the Marine Association, to be held on Feb. 20, a resolution prepared by that gentleman will be submitted that a by-law be passed to compel all grain shipments to be made in bags to prevent vessels shifting their cargoes at sea. The cost of bags would be trifling. They could be re-sold at nearly cost price in England, or they might be reserved for future voyages. The weight of those bags would be very little, not much more than that of the modern shifting boards now in use, and which have proved quite insufficient to keep cargoes steady.

Milling in Lawrence, Kansas.

We have the pleasure of presenting our readers this month with illustrations of two scenes in Kansas. The first represents the Douglas County Water Power Mills and Elevator, owned by J. D. Bowersock, of Lawrence, Kansas, and the second the Kansas river as seen from Massachusetts street in the city of Lawrence.

In one way or another the State of Kansas has been brought to the notice of the world very prominently, and the past few years, with the exception of one, when the grasshoppers did great damage in some portions of the State, have been years of great prosperity and advancement. The great wheat crops in Kansas have attracted much attention, and the milling interests of the State are becoming more and more important every year. The milling interests of the fair city of Lawrence is the subject of the present article.

It was known at an early day that there was an availabte water power in the Kansas river, at or near Lawrence. Several surveys of the river were made at one time and another, with a view to determining the amount of fall that could be obtained, and the approximate cost of establishing the power. The river at this point is about 600 feet wide, and has an average depth of from 6 to 8 feet. Its flow through the year is well maintained. .

The Kansas river at Lawrence carries the waters of several large and important streams which drain the greater part of the country lying between the Platte river on the north and the Arkansas on the south, and reaching west nearly to the Rocky Mountains. The Saline, the Smoky Hill, the Solomon, the Republican, and the Big Blue all discharge their waters through this channel. Draining so wide an extent of country, the stream itself is durable, and never runs dry. There is an abundance of water the year round.

The subject of building a dam across the Kansas river at Lawrence, began to be earnestly discussed in 1871. During the next year the matter was talked up, and a company organized. In 1873 the work was begun, and with varying fortune pushed, to final completion in 1874. It has since been enlarged and strengthened until now a permanent and substantial dam, 8 feet high, has been secured, affording a minimum power of 1500, and capable of being increased to 2500 horse power. There is no other power like it, that we know of, west of the Mississippi river. Certainly there is nothing to compare with it in Kansas or in Missouri. That this power is destined to build up a large and profitable manufacturing industry about it, hardly admits of a doubt. It would alone be sufficient to cause the growth of a respectable town. It has already been utilized in furnishing power for the Douglas County Mills and Elevator.

The Douglas County Mills, with twelve run of stones, are now manufacturing upwards of three hundred barrels of flour per day. The capacity of the mills has lately been doubled, Todd & Co., of St. Louis, furnishing the material, and John O'Connel, of St. Louis, the millwrighting. The mill was only shut down two weeks, and so thoroughly was the work done that it started up without a jar or break and commenced at once making better flour than ever before. The flour made by these mills has always led the trade wherever sold, and the mill has always had an order trade for its entire manufacture without any soliciting salesmen anywhere. Another fact that speaks very highly for the excellence and uniformity of these goods, is that parties who have lived in Lawrence, now removed to Kansas City. Topeka, Emporia, and points outside send to the mills or to Lawrence dealers for their flour.

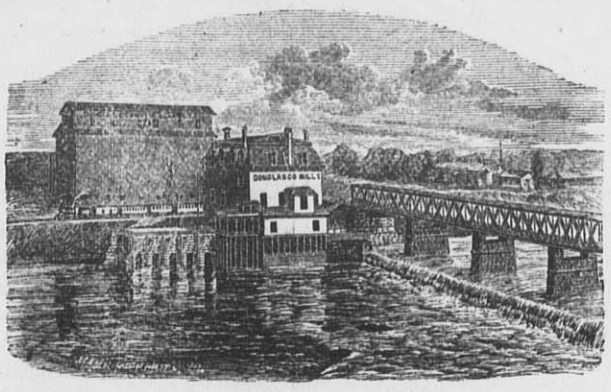
The enlargement of these mills not only increases their capacity, and betters the quality, but decreases the cost of manufacture, the expense of running a twelve-run mill, being but little more than that necessarily contingent upon one-half of the capacity.

The location of this property is doubtless the best in the West. The mill elevator is the largest in the State, one hundred feet south of the mill, receives all the grain. Here the wheat is passed through two seperators, and spouted into the mill through an iron tube one hundred and forty feet long. This iron tube assists in scouring the grain, and is equal to one cleaning. In the mill the wheat is put through another separator, smut machine, brush machine, and rolling screen, thence to the stones. Between the mill and elevator is the large flour warehouse for the storage of flour. The mill switch runs along side the warehouse, and the product of the mill as it comes from the packers is placed upon trucks and with one handling is placed direct in the warehouse or the car, by a track from the mill through the warehouse.

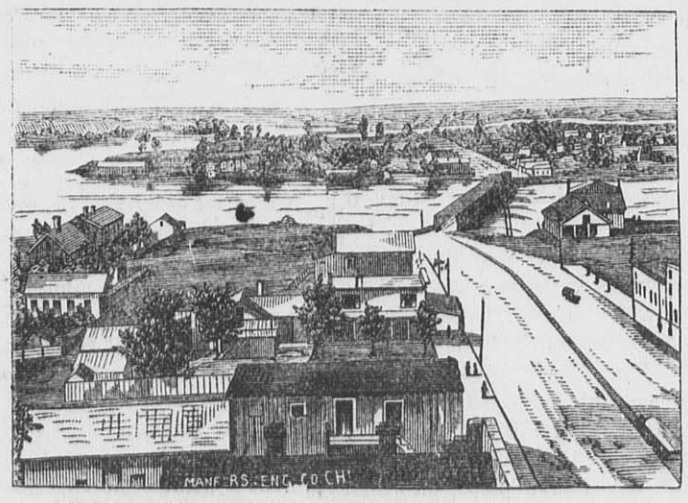
This water power also furnishes power for the Delaware Mills, Moak's elevator on the north side, and the Pacific Mills, two barbed wire factories, a shirt factory, and hay press on the south side, by means of wire cables. There is yet about 1500 horse power to spare for additional flouring mills and other manufacturing institutions.

Mr. J. D. Bowersock owns this power and will give the most liberal terms to parties who will build substantial manufacturing institutions in Lawrence. Kansas people are liberal and enterprising almost to a fault. They are bound to *build up*. The climate of Kansas is delightful and healthy, as the writer of this knows from personal experience, and Lawrence is as handsome a city to live in as one could reasonably wish for.

The Lawrence *Daily Journal* in a late issue says: "In addition to the manufacturing establishments above alluded to as making use of the water power, Mr. S. B. Pierson is erecting an extensive flouring mill near the head of Massachusetts street, which is to be rnn by it. The foundations of this structure are now being laid, and the mill will be in operation early next season. Parties from Ohio have lately purchased lots in the same vicinity but on the other side of Massachusetts street, and will erect a flouring mill thereon. The concentration of flouring mills makes Lawrence already the leading point west of St. Louis for the manufacture of flour. When we consider that in the year 1878 Kansas led the nation in her products of wheat, and that the exports of wheat from the United States are taking more and more the form of flour, it is easy to see to what a magnitude the manufacture of flour may yet grow in Lawrence. There are manifest advantages in the concentration of a business of this kind. It makes a large market where the producers of wheat, on the one hand, can always find extensive stocks from which to purchase. It also assists largely in securing favorable rates of transportation. We do not wonder, therefore, that the superior advantages of Lawrence as a point for the manufacture of flour, are beginning to attract the attention of intelligent millers throughout the country, and bid fair to build up here one of the most important centers of milling in the West.



The Douglas County Waterpower, Mills and Elevator, Lawrence, Kan.



The Kansas River from Mas-achusetts Street, Lawrence, Kansas.

Dakota Wheat-Fields.

Of the 400,000,000 bushels of wheat produced in the United States, by far the largest portion is sown in the fall, and is called winter grain. The varieties are conditioned by soil and climate, the latitude of Milwaukee marking in general the northern boundary of winter wheat.

The area suited for the production of wheat sown in the spring hitherto has been of limited extent, but there is an undeveloped section of the country so wide and far-reaching that it may be regarded as the great summer wheatfield of the future. Its capabilities are so vast, and the insurance of production so certain, that the millions of the Old World may ever think of it as a land that will supply them with bread.

A traveler making the tour of the St. Lawrence and its connecting chain of lakes, landing at Duluth, and journeying West over the Northern Pacific Railroad two hundred miles, beyond the forest region of the Upper Mississippi, will find himself on the eastern edge of the broad land of the future—the valley of the Red river—a stream flowing northward to Lake Winnepeg, and thence to Hudson Bay.

In August, 1869, the writer of this article rode over this former hunting ground of the Sioux, where through bygone ages they chased the buffalo and fought the Chippewas. The valley of the Red river was a vast expanse. No hill, no gentle undulation, nothing but the fringes of trees along the streams, bounded the sight It was a reach of prairie unbroken by the plow. Our own voices, or the song of meadow-lark, plover, curlew, and other fowl alone broke the solemn and oppressive stillness of the solitude. At Georgetown the Hudson Bay Company had reared a house, and two or three settlers had set up their cabins on the banks of the river. We encountered a man whose birth-place was in Virginia, who had been a frontiersman in Ohio, Indiana, Illinois, Wisconsin—a vidette of civilization.

"Have you any neighbors?" we asked.

"Oh, yes; three families have just settled about twelve miles from here. They are getting pretty thick, and I shall have to move on, I reckon."

They have been getting thicker since, and the locomotive is speeding its way across the valley, on to the Missouri and beyond to the Yellowstone; it is flying down the valley to Winnipeg, and soon it will thunder along the Saskatchewan, far away in the distant Northland. Farm-houses dot the landscape; towns have sprung up; the traveler beholds piles of lumber, long lines of farm wagons, plows, seeders, harrows, reapers, threshers and farm engines at every railroad station. Marvelous the change; in 1869 a furrowless plain; 1879, a harvest of eight million bushels of grain—erelong to be eighty million!—*C. C Coffin, in Harper's Magazine for March.*

How to Get Rid of Rats and Mice.

These pests try the souls of men by determined inroads upon granaries and flour barrels, and test the tempers of women by their persistent visits to store room and closet. How many times have we had to take down whole rows of jars and bottles—in fact, to turn the closet inside out (and none but the initiated know what a task it is to do this, nor how many things get packed away in a small store closet). If rats or mice once nibble their way in, they are sure to get into the rice or the oatmeal, or they try their teeth on the paper covers of sweetmeat jars and jellies. Not content with that, they will so leave the marks of their jelly-covered feet all over the shelves, dishes, etc., that there is no choice but to rout out everything and have a grand cleaning up. True, the pickles and preserves and the various stores may need looking over, but one likes to choose one's own time for that purpose. We have always found it a good plan to stop up any holes in the wall with plaster of paris, and to nail pieces of tin over holes in the floor. But this is not infallible, for sometimes after half a day spent in barricading and fortifying ourselves against our small enemies, we have in a day or two found ourselves outwitted and our shelves again invaded. We have often wondered that in these days of science and inventions for the comfort of the race, and for the mitigation of evils long endured, some one has not turned his attention to devising some way of doing away with this trial. This subject was suggested to us by the statement from one who claims to know by experience, that if green elder be thrown about among grain bags and in the haymow, every rat and mouse will leave at once, and that the leaves of the common mullein are so disagreeable to rats that they will not remain where it is. This may have originated with some one who wished to make a "corner" in mullein-stalks and elder-blows, and in order to realize something from their uncultivated lands; we cannot tell, but it certainly does seem a simple remedy, and one easy to try.—*Ex.*

Blacksmith's Hammer Signals.

When the blacksmith gives the anvil quick light blows it is a signal to the helper to use the sledge, or to strike quicker.

The force of the blows given by the blacksmith's hammer indicates the force of the blow it is required to give the sledge.

The blacksmith's helper is supposed to strike the work in the middle of the width of the anvil, and when this requires to be varied the blacksmith indicates where the sledge blows are to fall by touching the required spot with his hand-hammer.

If the sledge is required to have a lateral motion while descending, the blacksmith indicates the same to the helper by delivering hand-hammer blows in which the hand-hammer moves in the direction required for the sledge to move.

If the blacksmith delivers a heavy blow upon the work and an intermediate light blow upon the anvil, it denotes that heavy sledge blows are required.

If there are two or more helpers the blacksmith strikes a blow between each helper's sledge hammer blow, the object being to merely denote where the sledge blows are to fall.

When the blacksmith desires the sledge blows to cease, he lets the hand-hammer head fall upon the anvil and continues its rebound upon the same until it ceases.

Thus the movements of the hand-hammer constitute signals to the helper, and what appear desultory blows to the common observer, constitute the method of communication between the blacksmith and his helper.

Milling Patents issued in 1880.

The following patents of interest to millers were issued from the U. S. Patent Office.

January 6th 1880.

Rice Hulling Machine.—Thos. M. Green, Milledgeville, Ga.

Grain-Separator.—John A. Krake, Buffalo, N. Y.

Turbine Water Wheel.—William Mercer, Lancaster, Pa.

January 13th 1880:

Millstone Feeding Divice.—John G. Houlsworth, Jefferson Pa.

Flour Bolt.—Andrew J. Terry, San Francisco, Cal.

January 20, 1880:

Grain Meter.—Wm. H. Allen, New York City.

Dust Separator for Flour Mills.—George T. Smith, Bloomington, Ill.

January 27th, 1880:

Magnetic Grain Separator.—Chas. E. Fritz, Oneonta, N. Y.

Millstone Paint Staff.—Wm. Lehmann, Milwwukee, Wis.

Middlings Grinding Mill.—Jonathan Mills, Milwaukee, Wis.

Middlings Purifier.—John Russell, Plattsburg, Mo.

February 3d, 1880:

Turbine Water Wheel.—Henry W. Baltz, Sr., Philadelphia, Pa.

Water Wheel.—John L. Bates, Franklin, Ark.

Barrel Lifter.—William Brown, Green Point, N. Y.

Grain Measure.—Henry M. Dygert, Pine Township, Mercer Co., Pa.

Turbine Water Wheel.—Wm. B. Farrer, Greensburgh, N. C.

Millstone Dressing Machine.—Daniel S. Greenwald, Warren, Ohio.

Bag Tie.—Moses Y. Hall, Vinal Haven, Me.

Grain Drier.—James L. Norton, Buffalo Mills, Pa.

Grain Separator.—John A. Olson, Red Wing, Minn.

Balancing Device for Grinding Mills.—Hiram Smith, Honeoye Falls, N. Y.

February 10th, 1880:

Water Wheel,—Edgar B. Brooks, La Porte, Ind.

Oat Meal Machine—William Eberhard, Akron, Ohio.

Chop Conveyor for Millstones.—James H. Ellis, Gooderich, Ontario, Canada.

Millstone Driver.—Wm. Johnson, Milwaukee, Wis.

Bag Holder.—Wm. Yerdon, White Plain, N. Y.

February 17th, 1880:

Grinding Mill.—Louis Durand, Quebec, Canada.

Middlings Purifier.—John M. Ludwig, Edenburg, Va.

Middlings Purifier.—Thamas B. Osborne New Haven, Ct.

Grain Cart.—Treat T. Prosser, Chicago, Ill.

NEWS.

EVERYBODY READS THIS.

ITEMS GATHERED FROM CORRESPONDENTS, TELEGRAMS AND EXCHANGES.

Nortonville, Kan., is having a new flouring mill erected.

Wm. G. Elliott's mill, at Sharon Springs, Va., is being enlarged.

G Hopping has gone into the milling business at Helvetia, Minn.

A couple of Ohio millers claim to have discovered perpetual motion. Next.

Work on the new grain elevator at Forest City, Iowa, is rapidly progressing.

The Anchor Mills, Minneapolis, Minn,, are putting in Downton Roller Mills.

More than half of the land under cultivation in South Australia it sowed to wheat.

Corn meal in considerable quantities is being shipped from Kansas City to Louisiana.

Reports from Tasmania, Australia and New South Wales show a bountiful wheat harvest.

Joseph Johnson has recently purchased the flouring mill at Flowerfield, Mich., for $8,000.

It is estimated that the colony of Victoria will have 6,300,000 bushels of wheat for export.

F. C. Hollis, of Pembroke, Ky., is enlarging his mill and adding all the new improvements.

It is claimed that wheat from India, when sown in other countries, is not liable to "rust."

The Winona Mill Co. have ordered 30 roller machines from Ewd. P. Allis & Co., Milwaukee, Wis.

M. S. Week's flouring mill near St. Charles, Minn., was burned Feb. 5. Loss, $5000. No insurance.

The total flour production of St. Louis for the year 1879 was 2,112,949 barrels of 196 pounds.

An effort is being made by Cuban authorities to secure a reduction of import duties on breadstuffs.

Burned Feb. 3. John Bœhm's flouring mill at Monroeville, Ohio. Loss, $25,000. Insurance, $6,000.

F. George's grain elevator at Clarksville, Neb.. burned Feb. 25th. Loss, $3,000. Insurance, $1,500.

A fire in Fisher's mills in Chicago, Feb. 26th, did about $1,400 worth of damage. Partially insured.

Joseph Pollock & Co. of Vincennes, Ind., have ordered bran rolls from Ewd. P. Allis & Co., Milwaukee, Wis.

Kærcher, the Southern Minnesota mill man, has recently transferred property amounting to $20,000 to J. C. Easton.

Ewd. P. Allis & Co. are furnishing the Yaeger Milling Co. of St. Louis with the granulating and bran rolls.

The Conover grist mill at Maroa, Ills., has been purchased by a Mr. Emery and will be converted into an elevator.

HOYT & SIEGER'S mill at Frontenac, Minn., was totally destroyed by fire Feb. 24th. Loss $20,000; insurance $13,000.

Messrs. Russell & Wilford, mill furnishers of Minneapolis, Minn., have dissolved partnership and gone out of business.

G. W. Browning's mill at Worthington, Ind., is being enlarged, new buhrs, four-reel bolt, purifiers and elevators being added.

H. A. White & Co., of Republic, Mo., have contracted with Nordyke & Marmon Co., of Indianapolis. Ind., for a two-run steam mill outfit complete.

The dry-kiln in the Smith Middling Purifier Works at Jackson, Mich., fell Feb. 9th, smashing the engine house, engines, boilers, etc. Damages heavy.

New Yorkers are stirring up the World's Exposition business for 1883. It will be too soon after the miller's international *exposish* to make much of a success. Eh, Cincinnati?

Mr. William Watson (late of Caldwell & Watson, elevator builders at St. Louis, Mo.), bas been engaged the by Nordyke Marmon Co. of Indianapolis, Ind., to take charge of their elevator department.

Cable dispatches disclose that a terrible famine prevails in the Caucasus, and in the provinces of Saratof and Kief, in Russia. To such extremities are the stricken people driven that it is reported suicides are becoming common, and in the Caucasus they are selling off their chhildren.

London, Eng., has been afflicted with dense fogs more than usual of late.

One of the largest sugar mills in the world is soon to be erected in St. Charles parish, Louisiana.

Lee & Wells, at St. Joseph, Michigan, have changed to Wells & Southerland, "St. Joseph Mills." Mr. Lee, retiring from business.

Messrs. Bertuch & Co. of Buenos Ayres, Argentine Republic, South America, have just commenced the publication of a milling journal in the Spanish language.

Millers' wages in Buda-Pesth, Hungary, rage from $2.50 to $5.00 per week, and in the provinces from $1.50 to $3.75 per week.

The Reliance Works of Ewd. P. Allis & Co., Milwaukee, Wis., are running night and day in order to fill their orders for engines, rolls and mill machinery in general.

The great Dalrymple farm is to be increased 5,000 acres in 1880. It will be indeed a great sight to see 25,000 acres of growing wheat in one field. The force of laborers is to be increased to 700 men.

That well-known firm of "dusty millers," Messrs. Chisholm Bros., of Chicago, have orders for supplying McKean Bros'. mill, near Terre Haute, Ind., with several of their gradual reduction machines.

336,301,826 million gallons of beer were manufactured in the United States in 1879. The same year Great Britain manufactured 1,245,500,000, and still there is a famine in Ireland.

At Atlantic, Iowa, February 19th, a grain elevator belonging to C. T. Gilman & Co. burned, containing 60,000 bushels of grain. An adjoining corn crib, containing 60,000 bushels, was also consumed.

Upton, Ky., is to have a new process custom and merchant mill. Upton & Caves are the purchasers, and Nordyke & Marmon Co., of Indianapolis, Ind., the makers and furnishers of the entire machinery.

A new mill is being built at Ontario, Wis.

Nordyke & Marmon Co., the mill builders of Indianapolis, Ind., are building a new mill for Samuel Rycroft, of Appleton City, Mo.

T. N. Madden's child, Hebron, O., choked itself to death by pulling a table over, on which was some meal, the meal running down its throat.

Koenig's Mill, owned by Messrs. Hedrich & Strauss, Buda-Pesth, was destroyed by fire, supposed to be caused by over heated bearings. Loss, $175,000. Insurance, $125,000.

Rye straw is as valuable as the grain in Pennsylvania in the manufacture of paper. With the increased acreage of the season (3,500,000 bushels) the yield is not equal to the demand.

Strauble & Ebeling, of Green Bay, Wis., are making extensive improvements in their mill by putting in five run of the Milwaukee Middling Millstone Company's stone, crushers, etc.

A fire February 19th destroyed the Lowe's Creek flouring mill, three miles south of Eau Claire, Wis., belonging to Peter Daniels. Loss on building and machinery, $6,000, on which there was an insurance of $3,200.

Peter Provost, of Appleton, Wis., manufacturer of the Victor wheat heater and drier, reports that he is making numerous sales, and that his heater gives general satisfaction. His sales during the past month have ranged all the way from Pennsylvania to Dakota, and pleasant testimonials of merit greet him daily.

R. L. Downton's new machine for breaking wheat is called the "Disruptor." It consists of two rollers thirty inches in length by twelve inches in diameter, both revolving in the same direction, but at different velocities, one revolving 450 times while the other revolves only ten times. The rolls are corrugated and have a tearing or breaking tendency rather than a cutting.

NEW MILLS.—Flouring mills are being or are to be erected this season at Rush City, Minn., Springville, Minn., Sanborn, D. T., Sioux Falls, Dakota, Swan River, Minn., Nicollet Island, Minneapolis, by the Island Improvement Co., Rochester, Minn., by John M. Cole, Oberlin, Kan., by Pratt & Talley.

Ewd. P. Allis & Co., of Milwaukee, Wis., are remodeling the Excelsior mills of C. A. Pillsbury & Co. of Minneapolis to their gradual reduction system by rollers, and are putting in some 20 roller machines, both grooved chilled iron and porcelain.

Peter Mann of New Albany, Ind., is putting in the Allis' grooved and porcelain rolls, for bran and middlings. Rolls bought of Ewd. P. Allis & Co., Milwaukee, Wis.

The New Era Mills, at Nashville, Tenn., have shut down. Nordyke & Marmon Co's millwrights, of Indianapolis, Ind.. are putting in six new run of stones, rolls, bolts and other machinery, making a thirteen-run mill, all the work being from their mill furnishing works, including that of the mill when first built.

The Phœnix Mills, of Milwaukee, owned by E. Sanderson & Co., have lately added four new 60-inch steel boilers, with an automatic stoker attachment, the latter made by a Detroit firm. Mr. Cromwell showed it to us the other day and explained its workings, and said that it was a most valuable invention, and gave very satisfactory results. It is the only automatic stoker yet introduced in any of the Milwaukee flouring mills. The Steam Supply Company are using one also.

Ewd. P. Allis & Co. of Milwaukee, Wis., have orders from the following parties for their Roller machines: Hurst & Bro., Richmond, Ind., bran machine; Jno, P, Early, LaPorte, Ind., porcelain rolls; Evans & Sohl, Noblesville, Ind., bran machine and porcelain; S. Q. Kendall, Kendallville, Iowa, bran rolls; John Kaercher, Isinours, Minn., granulating rolls; Breckenridge & Jenkins, LaFayette, Ind., bran rolls; Geo. Cecil & Co., Logansport, Ind., porcelain rolls.

The editor of the Marshall (Dakota) *News* took a long ride across the prairie the other day, and only met one man on the whole trip, and he said he was just stepping over to his neighbor's. The closest observation could not reveal the outline of a house anywhere, and to the question how long he intended to keep "stepping" before he reached his neighbor's, the answer was: "Well, I'm most there now. I've only six miles to go yet; but last spring we had'nt any very near neighbors."

On the morning of Feb. 13th the walls of the Imperial Elevator in Chicago gave way under the enormous pressure of the grain stored therein, and buried the Imperial Flour Mills at the south end of the building. The elevator had been examined by an *expert* (?) the day before and pronounced safe. Messrs. Douglas & Stuart owned the elevator, which was only finished in August, 1879, at a cost of $100,000. Messrs. Munger & Wheeler were the lessees, and they estimate their loss on grain at from $50,000 to $60,000. The loss on the mill, owned by Douglas & Stuart, is estimated at $50,000. There was no insurance against accident, so the loss falls on the owners and lessees.

Resuscitation.

EXPERIMENTS WITH THE BODIES OF THE TWO MURDERERS HANGED AT MURFREESBORO.

A reporter describing the attempt to resuscitate the negroes hanged at Murfreesboro, Tennessee, says: After they had been suspended for seventeen minutes they were cut down, and Dr. Sleger, of Nashville, and Drs. Byrne and Murfee, of this city, attempted the experiment in resuscitation which was proposed some days ago. They did not begin until thirty minutes after the men had been cut down. A number of physicians were present to witness the experiment. After the clothing had been taken off, their bodies were wrapped in hot blankets, applications were made to their necks to reduce swelling, and and artificial respiration brought about by the means usually applied in cases of persons who have been in the water for a long time. All this was preliminary to the application of electricity. Batteries were placed in juxtaposition to the spinal cord and different portions of the brain. The effects of the application were soon apparent. First came nervous muscular twitchings in those parts of the body with which the batteries were placed in contact. The temperature was gradually increased until it reached over 100 degrees. The effect was immediate. The muscular contractions increased. The limbs twitched and shook like men asleep, and struggling under the spell of a horrid nightmare. The regular drawing in and expulsion of air, produced by the appliances referred to, were horribly real and life-like. The respiration came with an effort, however, and sounded like the gasps of men struggling for breath. Dr. Sleger put his hand to their wrists. "The pulse is beating," he said. "You can feel it, but faintly." Their eyes next opened, under the effect of the electric current, and turned about the room in a vacant gaze. There was no sound but the labored gasping at their lips. "Gentlemen," said Dr. Sleger, "the experiment is concluded. Our main object was to show the effect of electricity upon the muscular centers, and we have exhibited that, I think, in a remarkably realistic way."

Correspondence.

[From F. Sheldon & Co., Fitchburg, Mass.]

"Trade in Massachusetts is very good. Our manufactories are running—many of them 18 hours per day."

[From C. H. Veil, Esq., Arizona.]

"The milling industry in this far Western Territory is, one might say, in a 'fair to middling' condition. Our best flour is worth $8 per barrel, and superfine grades $6.50 to $7.00. Wheat is worth $1.20 per bushel. I will send you samples of our wheat and flour, which you can compare with those of 'the States.'"

[From J. F. Lee, Dryden, Mich.]

"Your paper at hand, and I am very much pleased with its reading and general make-up. I started up this mill October 13, 1879, rebuilding on the site of the one which burned 12 years ago. I have 2-runs of stones (and shall add 2 more runs next fall) and all the necessary cleaning and bolting machinery. The mill runs from 14 to 18 hours per day on custom work. The winter has been mostly mild and the roads muddy. There is a great deal of wheat yet left in this vicinity in the hands of our farmers, who feel confident that the price will go to $1.75 per bushel. Some of our farmers have as high as 2,000 bushels on hand. It seems strange to me to look at the enormous crops we are blessed with in this country, which are held back by speculators, while the reports come to us daily of the starving condition of the people in Europe. Had we not ought to be punished by a famine here, to learn us a lesson not to hoard our grain when half the world is starving? This mill is driven by an ample water-power, with a 40-feet head. The water is carried about 200 feet under ground in a large water-pipe that enters a standpipe 45 feet high, at the bottom of which are placed the turbine wheels that drive the mill. The wheels and gates are made of brass and perfectly tight. They are set in iron flumes and these flumes are bolted to the standpipe. I have taken especial pains to have all my machinery that I have, the best in the market, and to have the mill conveniently arranged for doing a steadily increasing business, and as I make additions, which I shall, as fast as circumstances will permit, they shall be of the best. 'The best in the end is always the cheapest.'"

Changes of Flour in Becoming Bread.

In popular use we employ the word "bread" to qualify loaves which are served in slices. The rolls are much smaller. Both consist alike of crumb and crust. The crumb is made up of a multitude of cells of thin walls containing carbonic acid gas, the product of fermentation in the dough. These walls of the cells contain both gluten and starch, and traces of dextrine and sugar. As a consequence of the treatment of water and the application of heat, the starch grains, which, in their normal condition, are little sacs filled with minute granules of starch proper, have been swollen and burst. Starch similarly treated by itself, as in the preparation for stiffening linen in the laundry, when dried in a thin layer upon glass plate, for example, is transparent, and presents a glazed surface. When this glazed material is removed with a knife-blade, it is seen to be stiff and horny. The gluten, which is mixed with it in the crumb of bread, and which may be conceived to be continuous, however thin throughout the wall of the cell, has been, by the process of baking, dehydrated; that is, the heat to which it has been subjected has driven out a certain anount of water, which chemically sustains something like the same relation to the gluten from which it has been expelled that the water expelled by heat from alum-crystals sustains to the original body of alum. This is the condition of the gluten from the crumb in the interior of the loaf at the instant of its removal from the oven. On drying, it abstracts the water from the starch with which it is coated, or intimately mixed, as the roasted alum absorbs the water that is sprinkled upon it. The starch, by this process, being dried and stiffened, gives its support to the walls of the cell, and renders the texture of the stale loaf more firm than that of the fresh loaf.—*Prof. Horsford.*

Clinton Briggs, Esq., proprietor of the Star and Cresent Mills, at Chicago, has been making extensive repairs and additions in the mill, having put it in thorough order and introduced Brehmer Brothers' system of millstone ventilation, several sets of roller mills and purifiers, and increased the bolting capacity. Mr. Briggs' enterprise is manifest in other matters, inasmuch as he is treasurer of the new Western Manufacturers' Mutual Insurance Co.

CINCINNATI, 1880.

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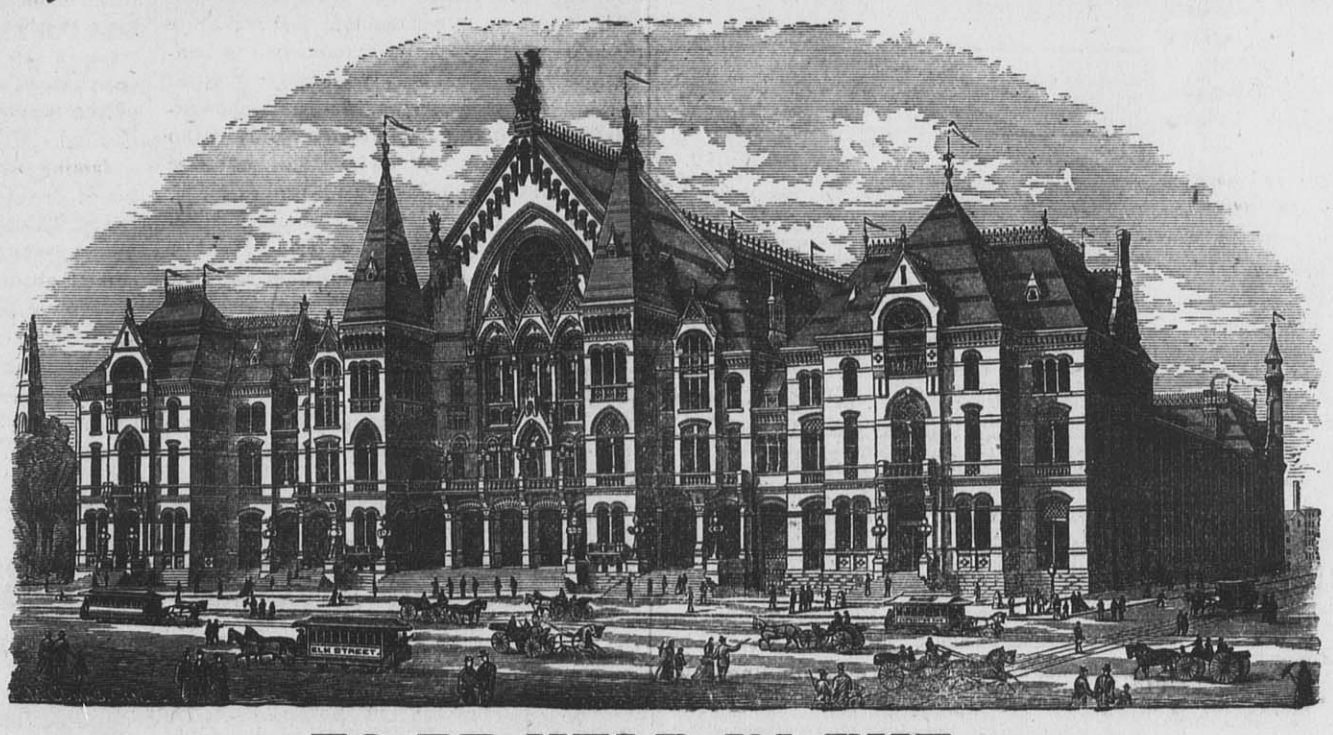

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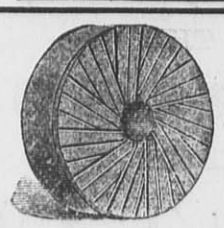

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Yorkshire Baking.

Mr. Fred. Ross, London, writes: A physician in a work published in 1572, says: "Bred of dyvers graines, dyvers formes, in dyvers places be used; some in forme of manchett, used of the quality; some of great loaves, as is usual among yeomanry; some between both, as with the francklins; some in forme of cakes, as at weddings; some round of hogs as at upsittings; some seninels, cracknels, and buns, as in the Lent; some in brode cakes, as the oten cakes in Kendall, on yrons; some on slete-stones, as in Hye-Peke; some in frying-pans, as in Derbyshire; some between yrons, as wapons; some in round cakes, as byskets for the ships. But these and all other, the mayn bred of Yorkshire excelleth, for that it is of the finest floure of the wheat well-tempered, best baked, a patterne of all others the fineste." That pre-eminence, which Yorkshire maintained for bread-making in the 16th century, can still be claimed, the women of that county being unquestionably the best cooks in England, more especially in the way of pies and other pastry, with whom the women of the South cannot for a moment be compared. Commend us for a substantial meal to that rich-crusted farm-house pie of Yorkshire, or the cream cakes, cheese-cakes, custards, and a host of other similar dainties, which a farmer's wife places on her tea table. Until quite recently private ovens were unknown in London. Some five and twenty years ago a friend of mine settling in London, brought up a Yorkshire oven, but could not find a bricklayer who understood the setting of it. If a Londoner attempts the fabrication of a pie, the result is, like Kate Nickleby's cookery, a perfect abortion, with a crust as thin as water and baked as hard as a stone a thing altogether different from what it means by a pie in Yorkshire. In Cockneydom, too, cheesecakes, tarts, &c., are never dreamt of for the tea table—"watercresses" or "winkles" being their only accompaniment to the bread and butter. Of such luxuries as collop-cakes, hot pots, or neddy-racks, the benigthed creatures have no conception. The Yorkshire men is distinguished for his love of pie. It is recorded of a Yorkshire farmer who had been in London a week, without getting anything for dinner but cuts of flesh meat, that he went into an eating-house and was presented with the bill of fare, which he cast his eyes over, and then cried out, to the amazement of the occupants of the neighbouring boxes, "Has to onny poy, lass? Ah haint had onny poy sin' ah com fra' yam!" William Ketrick was a Yorkshireman who wandered down south to seek his fortune. He settled finally in Plymouth, prospered in business, and when the town was incorporated, in 1439, he was elected the first Mayor, True to his county, at his installation feast he provided a wonderful Yorkshire pie, to the infinite astonishment to his guests. It was 14 feet long and 4 feet broad, and was composed of a mixture of all sorts of flesh, fowl, and fish, with a luscious crust of proportionate thickness, and was baked in a brick oven built specially for the purpose. A saying, "As big as Ketrick's pie," is still current, as a simile, in Plymouth.—*Leeds Mercury.*

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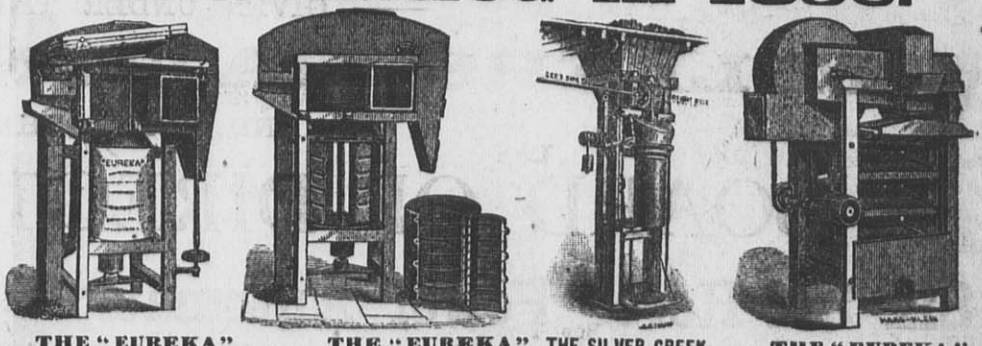

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